



The Ralph M. Parsons Company

Report Documentation Page

Report Date 05121977	Report Type N/A	Dates Covered (from... to) -
Title and Subtitle Aesthetic Impact Analysis of the Proposed Shallow Draft Barge Facility at the Point Arguello Boathouse		Contract Number
		Grant Number
		Program Element Number
Author(s)		Project Number
		Task Number
		Work Unit Number
Performing Organization Name(s) and Address(es) The Ralph M. Parsons Company Pasadena, CA 91124		Performing Organization Report Number
Sponsoring/Monitoring Agency Name(s) and Address(es) sponsoring agency and address		Sponsor/Monitor's Acronym(s)
		Sponsor/Monitor's Report Number(s)
Distribution/Availability Statement Approved for public release, distribution unlimited		
Supplementary Notes		
Abstract		
Subject Terms		
Report Classification unclassified		Classification of this page unclassified
Classification of Abstract unclassified		Limitation of Abstract UU
Number of Pages 82		



The Ralph M. Parsons Company

ENGINEERS • CONSTRUCTORS / PASADENA, CALIFORNIA 91124

December 5, 1977

Martin Marietta Corporation
Post Office Box 1681
Vandenberg AFB, California 93437

ATTENTION of Mr. R. M. Becker
Chief of Procurement
Vandenberg Flight Operations

SUBJECT Submittal of SDRL No. P049, TOR No. 101
Aesthetic Impact Analysis of the Proposed
Shallow Draft Barge Facility at the Point
Arguello Boathouse

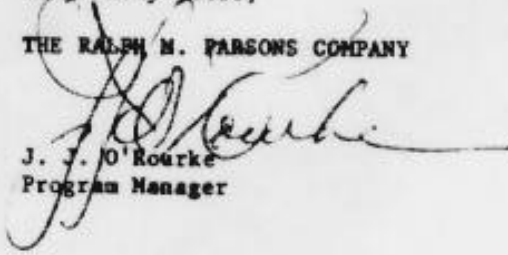
REFERENCE Contract No. VV6-940009

Gentlemen:

Transmitted herewith are five (5) copies of TOR 101 Aesthetic Impact Analysis of the Proposed Shallow Draft Barge Facility at the Point Arguello Boathouse dated December 5, 1977, which documents the procedure used to produce photographs requested by Martin Marietta Corporation in support of the Environmental Impact Statement public hearings, and includes a compilation of material used to develop aesthetic mitigation measures for VCR-76-055 Appendix 70, V33 Environmental Protection Plan under Task 3.4.3 Environmental Considerations.

Very truly yours,

THE RALPH M. PARSONS COMPANY


J. J. O'Rourke
Program Manager

JJO:dt
Enclosures as noted

CC: Mr. Vernon L. Dunn

RMP

Revision _____ Basic X

Document Control No. 101

Date December 5, 1977

TITLE: Aesthetic Impact Analysis of the Proposed Shallow Draft Barge
Facility at the Point Arguello Boathouse

SDRL Item No. P049

Contract No. VV6-940009

Prepared by: John R. Edwards
J. Edwards

Approved by: M. Fabrick
for M. Fabrick

THE RALPH M. PARSONS COMPANY
Pasadena,
California 91124

AESTHETIC IMPACT ANALYSIS
OF THE PROPOSED SHALLOW DRAFT BARGE FACILITY
AT THE POINT ARGUELLO BOATHOUSE

December 5, 1977

TOR 101

CONTENTS	i
List of Figures	ii
1. PURPOSE	1
2. INTRODUCTION	2
2.1 Overview	2
2.2 Summary of conclusion and mitigation measures	2
3. METHODS	5
3.1 Analytical technique selection	5
3.2 Data	5
3.3 Choosing views	6
3.4 Choosing perspective	7
4. AESTHETIC IMPACT ASSESSMENT	15
4.1 Comparative photograph development	15
4.2 Aesthetic analysis	16
4.3 Nonelimination of boathouse option	18
4.4 Aesthetic analysis limits	18
5. MITIGATION MEASURES	48
6. PERSONNEL CONTACTED	52
7. REFERENCES	54
APPENDIX A- Aesthetic Criteria	
APPENDIX B- Computer Program	
APPENDIX C- Observability from Jalama Beach	
APPENDIX D- Photograph Information	
APPENDIX E- Acronyms	

LIST OF FIGURES

Figure No.

1	Point Arguello Boathouse, USAF Aerial Photograph	4
2	Orientation Map Showing Boathouse with 300 Ft Grid Area	9
3	Topographical Map of Boathouse Area with 300 Ft Grid, Showing 15 Ft Grid Area	10
4	Visual Impact Assessment Views	11
5	Perspective View of Boathouse	12
6	Isometric View of Boathouse	13
7	View Showing Scaling Effects, Boathouse with docked SDB	14
8	Computer Plot of Point Arguello Boathouse with SDB Facility Aerial View	21
9	Computer Plot of Point Arguello Boathouse with docked SDB	22
10	Computer Plot of Boathouse, Aerial View, with background	23
11	Computer Plot of Boathouse with SDB Facility, Aerial View, with Background	24
12	Computer Plot of Boathouse with Docked SDB, Aerial View, with background	25
13	View from 1	26
14	View from 2	27
15	View from 3	28
16	View from 4	29
17	View from 5	30
18	View from 6	31
19	View from cut Centerline	32

LIST OF FIGURES (Contd)

Figure No.		
20	Jalama Beach Viewpoint	33
21	View of Boathouse from Jalama Beach, Computer Plot	34
22	View of Boathouse with SDB Facility from Jalama Beach, Computer Plot	35
23	View of Boathouse with docked SDB from Jalama Beach, Computer Plot	36
24	View of Boathouse (Arrows from Jalama Beach), Photographic	37
25	Artist is rendering of Boathouse with SDB docked	38
26	Computer Plot of Boathouse with SDB Docked, from Artist's Rendering Viewpoint	39
27	Photograph of Existing Boathouse from view 1	40
28	Retouched Photograph Showing Boathouse with SDB Facility from view 1	41
29	Photograph of Existing Boathouse from View 3	42
30	Retouched Photograph Showing Boathouse with SDB Facility From View 3	43
31	Photograph of Existing Boathouse from View 4	44
32	Retouched Photograph Showing Boathouse with SDB Facility From View 4	45
33	Photograph of existing Boathouse From View 5	46
34	Retouched Photograph Showing Boathouse with SDB Facility from View 5	47
35	Relocation of Point Arguello Boathouse	49
36	Screen Camouflage of ETE Access Route, Sectional Views	50
37	Screen Camouflage of ET Access Route, PlanView	51

1.0 PURPOSE

1. Purpose

It is incumbent on designers to preserve the aesthetic qualities of scenic areas (that are to eliminate or minimize adverse visual impacts). In order to accomplish this, a method of evaluating the aesthetic value of sites and facilities is needed. This report provides a systematic approach to aesthetic evaluation – a pursuit generally assumed to be subjective. Our approach achieves a degree of objectivity by producing accurate representations of the study object, identifying the field from which it is observable, and applying a systematic, reproducible aesthetic evaluation from within that field. While this report was developed to evaluate a specific proposed development, the methodology described herein is applicable to any project.

This document was prepared incidental to Task 3.4.3- Environmental Considerations- for the DOD STS Ground Support System. Its primary purpose was to gain insights into, and assess aesthetic impacts associated with, the development of the proposed Shallow Draft Barge Facility at the Point Arguello Boathouse in support VCR-76-055 Appendix 70- Environmental Protection Plan for V33 External Tank Processing and Storage Facilities- and to provide supplementary information for criteria development and design. Secondary objectives of this document were to recognize an aesthetic awareness within the STS program, and to assist SAMSO with the DOD STS Environmental Impact Statement process.

2.0 INTRODUCTION

2. INTRODUCTION

Consideration was given to delivery of External Tanks (Ets) at the Point Arguello Boathouse (Figure 1) via Shallow Draft Barge (SDB). This delivery concept requires the construction of an SDB docking facility with the capability of transporting the Ets from a wharf to the top of the 50-ft coastal terrace. Accomplishment of this requirement involves the excavation in the coastal bluff to provide an access road from the wharf to the top of the terrace. A cut of the required size in this relatively pristine coastline will alter the aesthetic value of the area.

2.1 Overview. Our National policy, as stated in the National environmental Policy Act of 1969 (NEPA) Section 101 (b), is to “assure for all Americans safe, Healthful, productive, and esthetically* and culturally pleasing surroundings” (emphasis added) in the course of Federal Project Development. Section 102 (c) of the NEPA also requires that reports of a project include a detailed statement concerning any irreversible and irretrievable commitment of resources, which would be involved (1)**. The California Coastal Act of 1976, Section 30251, states that “the scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance” (2). This, legislative requirements exist for analysis of changes in the aesthetic qualities of an area under consideration for development by any federal agency (A)***.

A Common approach to meeting such requirements is to state that a proposed facility will be visible and hence aesthetically impact the area and that the impact will be positive or negative depending upon the observer’s preconceived notions of beauty. Such statements, although easily justified philosophy, fail to give any insights into the actual aesthetic impacts of a project.

The methodology utilized in this evaluation portrays anticipated visual changes in an accurate manner and describes the subjective effects of such change on the visual quality of the scene. Visual quality as used in this report is taken to mean the sum of three components: 1) the memorability of a scene; 2) its degree of development; and 3) the harmony of its parts. These components are respectively refereed to as vividness, innocents, and unity (3).

2.2 Summary of conclusion and mitigation measures. The relative inaccessibility of the project area to the public limits the aesthetic impacts. The project is not visible for public highways, trails or aircraft. It is only barely visible for trains, commercial ships, and Jalama Beach County Park. The area could be visible from nearby on-base beaches and from pleasure craft passing close in.

*Esthetic is a variant of aesthetic (from the Greek aesthetes, one who perceives- pertaining to a Sense of the beautiful).

**Numbers in parentheses are keyed to contacts given in Section 7 of this report.

***Capital letters in parenthesis are keyed to contacts given in Section 6 of this report.

Application of aesthetic criteria in Appendix A shows no aesthetic degradation to be visible from beaches. From pleasure, craft there will be aesthetic degradation, which will be most severe from positions near projections of the cut centerline. From other orientations to the SDB Facility, aesthetic degradation will occur, but will be less noticeable than from the cut centerline projection (Section 4.2). Overall, aesthetic degradation is therefore rated as moderate.

Retention of the boathouse during SDB Facility development would slightly reduce the overall aesthetic degradation (Section 4.3).

In general, design engineers should familiarize themselves with aesthetic considerations and reflect the new awareness in the facility design. Reduction of cut size, relocation rather than elimination of the boathouse, and camouflaging including the use of color additives to the concrete pad and ramp to match surroundings, and aesthetically nonobtrusive erosion controls can be considered.

VCR-76-055



FIGURE 1. POINT ARGUELLO BOATHOUSE, USAF AERIAL PHOTOGRAPH

3.0 METHODS

3. METHODS

We decided that, as a minimum, an accurate representation of what the area looks like now, and what it will look like after project completion, should be produced for comparison and analysis. The selection of a technique to achieve this end, the mechanics of the technique used, and the choice of observation points and perspectives, is included in this section.

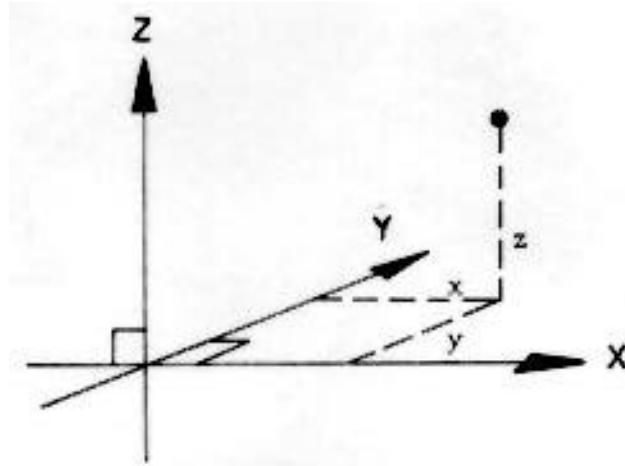
3.1 Analytical technique selection. Standard engineering practice is to produce an artist's rendering of a completed facility. However, an artist's impulse is to create beauty, and experience has shown that this tends to be expressed in idealized "portraits" of common buildings. A more objective approach to visualization of the proposed project was sought.

We found that several approaches could yield the desired output, namely perspective views of the cut from different angles and altitudes, which show the limits and types of visual impacts. One concept involved the construction of a three-dimensional model of the site area microphotography. Another concept involved covering the actual cut area with colored plastic sheets and photographing the effect from various distances and angles. We found both of these alternatives to be excessively expensive in comparison with three-dimensional computer simulation.

Three-dimensional computer simulation capable of using information derived from topographic maps of the area produced perspective images from specified distances, angles, and altitudes (the computer program is given in Appendix B). Thus, it was possible to move the observation point (called the "eyeball") through different angles at any fixed altitude and distance to define the observational field. By changing the distance or altitude, a three-dimensional observational volume was defined. This volume was subsequently trimmed by limiting parameters such as curvature of the earth, atmospheric interference, and most importantly, accessibility to the viewing public. The computer output was in the form of black and white pen drawings with terrain represented by distorted square cells. Thus, the output lacks one important characteristic in defining aesthetic appearance: color. Computer programs, which produce color output on a color cathode ray tube (CRT) display, exist, and are at the state-of-the-art. Time and cost constraints did not permit exploration of this technique. Instead, the computer-generated views were used in the production of color photograph touch-ups.

3.2 Data. The computer drawing of the boathouse area for visual impact assessment incorporated the following: the affected area, topographical features that would obscure sighting the facility, a portion of the mountainous backdrop to keep the impact in the perspective of a total field of view, and a portion of the coastline and waters accessible to the public. These criteria, weighted against the need for resolution and a finite number of data points, resulted in the choice of two areas; a low resolution background area (figure 2), and a high-resolution area focused on the facility site. Both areas are rectangular with the larger having dimensions of 16,800 ft by 6,300 ft and the smaller, 1,500 ft by 1,200 feet.

Any point in space may be represented by Cartesian coordinates relative to an orthogonal system of axes (e.g., x, y and z). Thus, each data point was recorded in terms of x, y, and z coordinates.



A topographic map of the low-resolution area was divided into 300ft by 300 ft cells (Figure 3) using the EW side as the x-axis and the NS side as the y-axis. At every point of the intersection of x and y grid lines, the elevation z was recorded (D). An identical procedure was used to divide the smaller area into 15-ft intervals for three different cases: the existing topography, the topography with the proposed SDB Facility, and the topography with the facility and the docked Shallow Draft Barge. To check the input data program (E), eyeball coordinate corresponding to a top view were used ($x=zero$, $y=0$, $z=1$). The resultant graphic corresponded identically to the topography maps used to generate the data.

3.3 Choosing views. Observation points were chosen by assessing the project area in light of the California Coastal Commission's guidelines on view projection, which state that scenic and visual qualities of coastal areas shall be protected when visible from public areas such as highways, roads, beaches, parks, coastal trails and accessways, vista points, and coastal streams and waters (2).

The Santa Ynez Mountains blocks views of the proposed facility site from any highways, roads and trails except those on Vandenberg Air Force Base, all of which are closed to the public. The area is visible, however, from the Southern pacific Railroad tracks, public beaches**, coastal waters, and possibly from Jalama Beach County Park.

*There is one exception to this: a piece of the breakwater was moved into the embayment as evidenced Figure 5. This resulted from one computer card being out of sequence. This was corrected before generation of analytical views.

**All California beaches below the mean high tide line are accessible to the public (e.g., at low tide).

The excavated cut will be only slightly visible from the Southern Pacific Railroad because of the existing terrain. The nearest point on the tracks is at an elevation of 160 ft approximately 1,600 ft from the nearest edge of the cut (F). This edge will be at an elevation of 60 feet. The far edge of the cut is approximately 1,800 ft from the tracks at an elevation of 40 feet. This geometry precludes sight of the cut. If the cut is visible at all from other viewpoints along the track, it will appear as a thin line of low contrast with the surrounding terrain. Thus, the viewshed of the cut from the railroad is extremely small and the aesthetic impact is none to very slight. Therefore, no views were analytically produced from this observation point.

Public beaches to the south of the Point Arguello Boathouse are accessible from Jalama Beach County Park. Beaches from the north are inaccessible to the public due to the rocky cliff barrier between Ocean Beach County Park and the boathouse at Point Arguello (see figure 2). Views of the area from the southern beaches were, therefore, deemed necessary. These are covered by views 1 and 2 in figure 4. From beaches closer to the boathouse than View 1, the cut in the cliff will approximate a vertical line in the cliff. From beaches further than View 1, the cut will appear to be graded between Views 1 and 2. Views further to the south were not considered to be necessary since the coastline continues eastward for 2 miles before curving southward, after which views are approximated and included by a view from Jalama Beach County Park (again, Figure 2).

Jalama beach County Park was considered as an observation point for the above-described consideration, and because it was calculated to be possibly visible. The calculations are given in Appendix C.

Coastal Waters surrounding the Point Arguello Boathouse are accessible to the public. Pleasure craft traveling along the California coast between Santa Barbara and Morro Bay (or further origins and destinations) generally pass one half mile to two miles offshore from this particular area around point Conception and Point Arguello. Pleasure craft do occasionally venture in closer to the boathouse area, though they usually do not approach closer than 2,000 ft offshore. Observation of the area from a pleasure craft deck would be at an average elevation of about 10-ft above sea level (G). Commercial vessels usually pass the area from 6 to 12 miles offshore.

On a map, an arc was swung around the boathouse at a distance of about 2,000 feet. Beginning from View 1 and ending past the line where view of the cut would be obscured by local topography, the arc was divided into five equal portions. These points were then adjusted to the grid origin and the six resulting view rays were plotted (figure 4). Rays were indicated in the figure rather than review points since the size of the computer output is adjustable and does not necessarily reflect the variations in size with distance along a ray. The distance-size relationship was later determined by photography and field observation.

3.4 Choosing Perspective. An accurate representation of the boathouse area is not possible without adjustments to the chosen computer program. Adjustments to the computer program were made by comparison with photographs. A conscious effort was made to produce baseline photographs, which accurately portray the viewed of the projected area.

Changes in the appearance of computer drawings using various degrees of perspective are clearly seen by comparing Figure 5, a view using maximum perspective, with Figure 6, a view using no perspective (called isometric). The perspective parameter, called ISO in the computer program (Appendix B), was adjusted by comparison with baseline photographs. Isometric displays most closely approximate the actual appearance of the area from distances greater than 2,000 ft (compare with Figure 1). The illusion of perspective in isometric drawings results from the omission of lines hidden by objects in the foreground (note the omission of terrain behind structures in figure (6)).

A parameter called the Scaling Factor (SC) also required adjustment. The one of two parameters, which controls the vertical and horizontal expansion of the computer, output. An example of faulty scaling which resulted in an exaggerated vertical (2) expansion is given in Figure 7 (compare with Figure 15). The other expansion controlling parameter, called RATIO (ratio of the x scale to the y scale) was left at one.

Baseline photographs used to adjust the program were taken with a 35mm format using a 55-mm lens. This equipment combination approximates human vision (H).



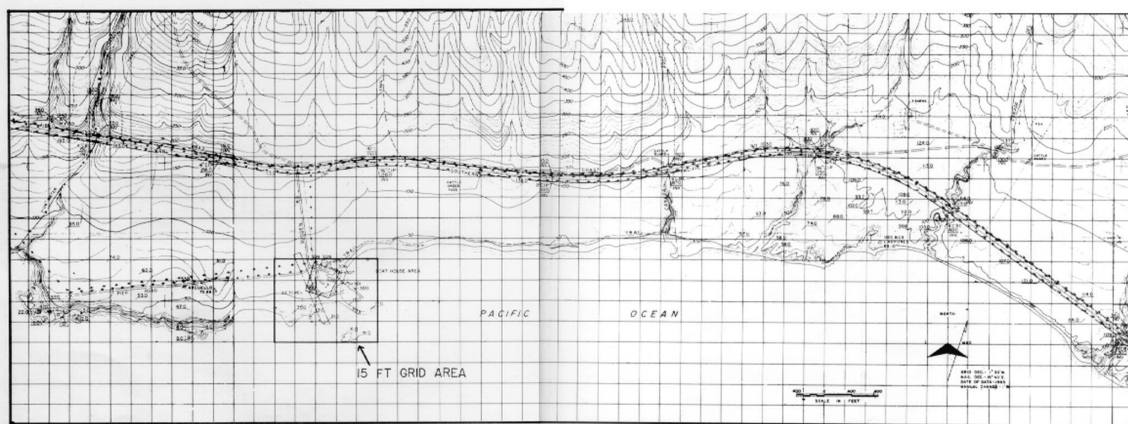


FIGURE 3. TOPOGRAPHIC MAP OF BOATHOUSE AREA WITH 300 FT GRID, SHOWING 15 FT GRID AREA

VCR-76-055

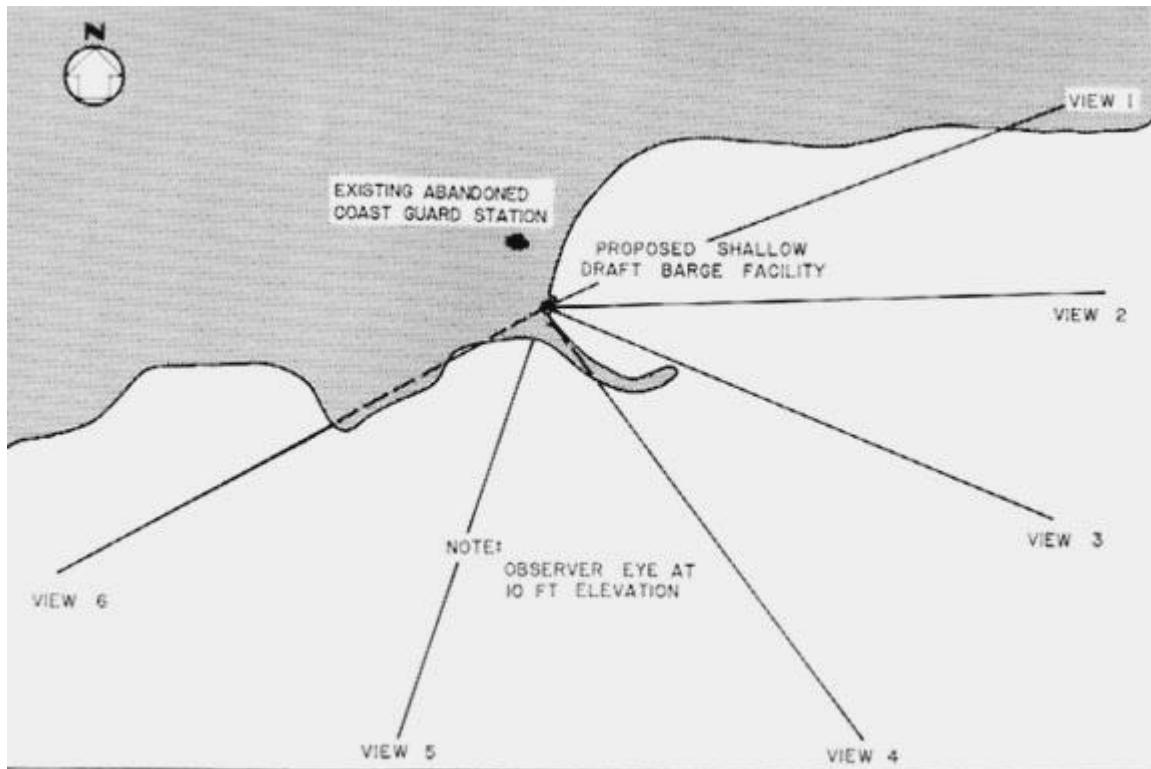


FIGURE 4. VISUAL IMPACT ASSESSMENT VIEWS

VCR-76-055

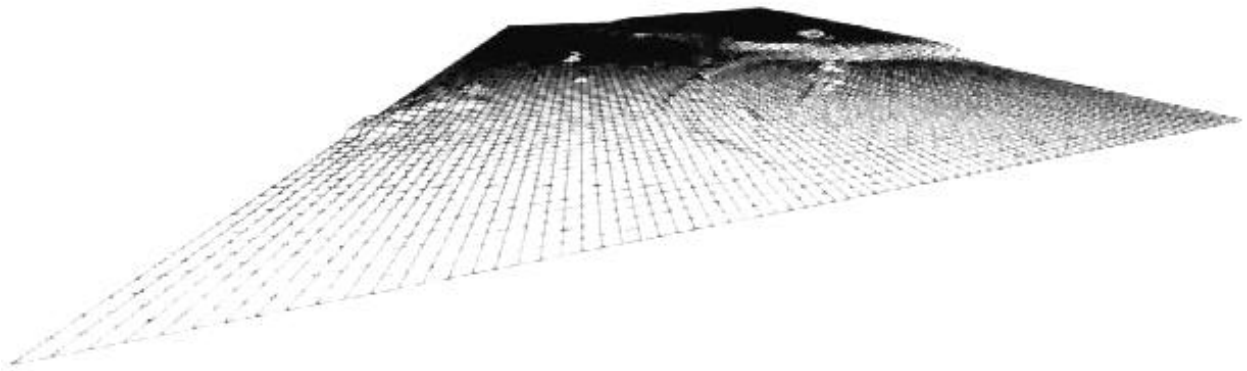


FIGURE 5. PERSPECTIVE VIEW OF BOATHOUSE

VCR-76-055

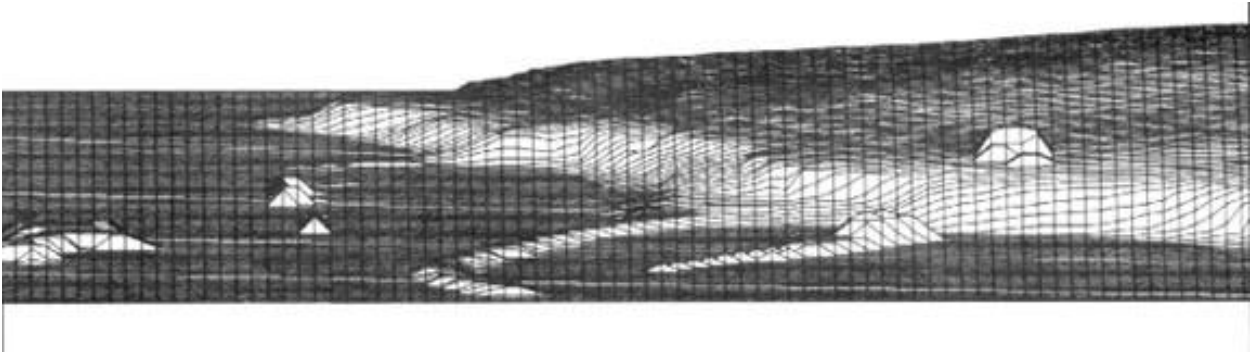


FIGURE 6. ISOMETRIC VIEW OF BOATHOUSE

VCR-76-055

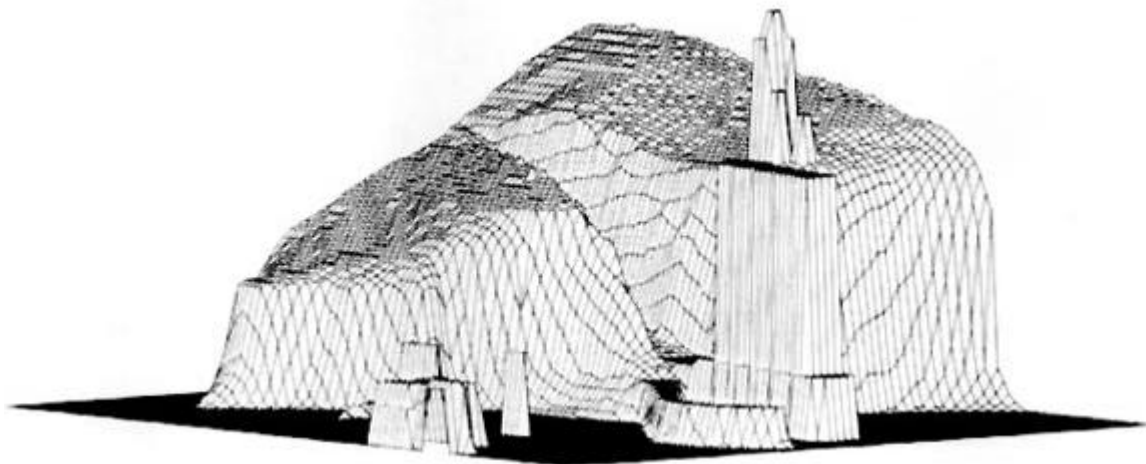


FIGURE 7. VIEW SHOWING SCALING EFFECTS, BOATHOUSE WITH DOCKED SDB

4.0 AESTHETIC IMPACT ASSESSMENT

4. AESTHETIC IMPACT ASSESSMENT

The strategy for assessing aesthetic impacts was first to produce accurate representations of what the facility would look like for comparison with the existing coastline. Views were carefully chosen to represent areas accessible to the public's eye. The preparation that went into production of these illustrations maximizes the probability that they include the aesthetic changes, which will occur, that might be visible to the public following construction of the SDB facility. These illustrations meet federal requirements for environmental impact statements in that they convey, to a person of average intelligence, the aesthetic changes, which will accompany the project.

The next analytical step was to compare and rate before and after photographs of the area from different observational views using aesthetic criteria developed for this purpose.

4.1 Comparative Photograph Development. An available photograph of the boathouse area (figure 1) was used to test and perform rough calibration of the computer program. The resulting output of the existing condition (Figure 6), with the SDB Facility (figure 8), and with the facility and NASA barge (Figure 9) show the capabilities and limits of the computer program. These illustrations, generated in the 15ft grid range, clearly indicate the magnitudes and orientations of the cut and barge in perspective. The building, barge, and rocks, however, appear to be cubist impressions of the true objects. *

Insertion of these views into the 300ft-grid range yielded the graphics presented in Figures 10, 11, and 12. In these figures, the 15-ft grid areas are blown up in the upper left-hand corners since the high density of points in the reduced version makes it difficult to see details.

For easy comparison, output of each view from the southern beaches and from pleasure, craft (Figure 4 indicates the viewing rays) are presented together on a page. The output from Views 1 through 6 is given in Figures 13 through 18. These drawings were checked by photographs and field observation and found correct in proportion and scale from a distance of 2,000-ft (± 150 ft). An identical layout is presented from along the cut centerline (Figure 1'9) to show the maximum visual impact of the SDB Facility.

The relationship of the Jalama Beach County Park viewpoint to the proposed SDB Facility is shown in Figure 20. The resulting computer graphics from this viewpoint are given in Figures 21, 22 and 23. These figures include a portion of the 300ft-background grid with the 15-ft grid inserted on the bottom, and a blow-up of the 15ft grid area on the top. These illustrations do not represent the true size of what could be seen from Jalama Beach. They do, however, represent what could be seen from along the beaches beyond two miles south of the SDB Facility. Photographs of the Point Arguello Boathouse.

*A program is available from Digital Enterprises, which will accurately represent structures on irregular terrain. The program used in this analysis in conjunction with touched-up photographs was deemed to be of sufficient detail (indicated by arrow in Figure 24) show that the area is barely visible from Jalama Beach County Park. In color photographs, the area is more distinct, and it is even slightly more visible with the unaided human eye. Even by direct observation however, the SDB Facility would be essentially undistinguishable at this distance.

Following the initial phases of the computer-generated drawings, an artist's "bird's-eye" rendering of the SDB Facility was produced (Figure 25). The artist's view eyeball coordinates were estimated and a computer drawing was generated to check the accuracy of the drawing (Figure 26). The computer output agrees well with the artwork and therefore verifies its use for presentation (this artwork is included in the Draft Environmental Impact Statement dated August 1977).

From the Above-described considerations, four views were chosen for more detailed analysis: Views 1, 3, 4 and 5. Color photographs were taken on a clear day along these rays at a distance of 2,000 ±150 ft from the boathouse (see Appendix C). Prints of these photographs were touched-up based on the computer graphics of each view, to show a realistic version of the completed SDB Facility. The SDB was not included since it is not a permanently emplaced feature of the facility (the SDB will be docked at Point Arguello a maximum of 5 days per year). Photographs from each view, showing before and after construction, are presented in black and white in Figures 27 through 34.

The color photographs produced using the above-described procedures provide accurate representations of the existing condition of the area and of what it will look like following SDB Facility completion from the most important viewpoints (as determined by observer accessibility). These photographs provide an adequate basis for any observer to make an independent judgement as to the aesthetic changes, which accompany development of the SDB Facility at the Point Arguello Boathouse.

4.2 Aesthetic Analysis. An analysis of aesthetic impacts using the before and after color photographs of the boathouse area was conducted using the technique given in Appendix A. This analytical technique is the best currently available for aesthetic analysis. It was used in one Environmental Impact Statement (EIS) and in other environmental assessments. The approach of this analysis is to break the aesthetic aspects of a scene into their component parts and analyze each part. The philosophy is that as more parts are identified, rating of each part call upon less subjectivity. Indeed, reported surveys using this technique tend to converge upon some numerical value for aesthetic changes. However, the technique is unable to yield an objective assessment of visual impacts since: 1) it may be argued that it does not include all important aspects of a scene, 2) it assumes equal weight-in between the three components, and 3) it makes value assumptions about the desirability or undesirability of development and harmony.

With these qualifications in mind, an assessment of Views 1, 3, 4 and 5 was made. An aesthetic evaluation form is included an Appendix A for the reader's independent evaluation of aesthetic changes.

View 1. The view is rated as moderately high in vividness due to the definition of the viewshed boundary, diversity of spatial enclosure, and prominence of water forms. It is not rated as highly vivid due to the lack of topographic relief, diversity in vegetation, prominence of natural features and vividness of sky. The proposed facility will slightly increase vividness since the definition of the water boundary and the man made element will be sharper.

The view is rated as intact since man-made development is dominated by the natural surroundings. The SDB Facility will slightly increase the inactness since the boathouse, which previously cluttered the view, is replaced by the innocuous (from this view) cut.

Moderately high unit is achieved in this view since the man-made elements are of the same architectural style. The proposed facility will slightly decrease this unity since the boathouse is removed and the cut and SDB pad do not conform to this architectural style. The unity will not be greatly reduced since the cut blends in well with the surroundings natural elements.

Overall, visual quality of this view is not degraded since the decrease in unity is offset by the increases in vividness and intactness.

View 3. The vividness of View 3 is rated as moderate: it is high in viewscape boundary definition, low in diversity of spatial enclosure, vegetation diversity, and sky vividness, and moderate in other areas. The SDB Facility will slightly increase the vividness of this view by increasing the vividness of man-made elements, topographic relief and diversity of spatial enclosure. It will not excessively increase the vividness since the boundary definition will be reduced.

The view is rated as intact since there is relatively little development in comparison with the natural surroundings. SDB Facility development will decrease the intactness since a larger portion of the view will be affected, and since the proposed facility is visually disturbing from this viewpoint.

The view is rated moderately low in unity of viewscape elements since the arrangement of man-made elements is awkward: the house on top of the cliff appears to sit atop the boathouse. It is not rated as very low since the structures are of the same architectural style. The SDB Facility will decrease the unity due to its clumsy appearance, but not drastically, since the awkwardness of the boathouse position will be eliminated.

Overall, visual quality of this view is degraded since the slight increase in vividness is dominated by the decreases in intactness and unity.

View 4. The view is rated as moderately vivid: the high boundary definition is offset by moderately low sky vividness, diversity of vegetation and vividness of man-made elements (which fade into the viewscape). The SDB Facility will slightly decrease the vividness of this viewscape by reducing the diversity of spatial enclosure and the vividness of man-made elements through elimination of the boathouse.

The view is rated as moderately highly natural, falling between the intactness of View's 1 and 3. The SDB Facility will slightly decrease the intactness since the cut is slightly visually disturbing.

Moderate unity is achieved due to horizontal balance of structures and similarity of architecture. The SDB Facility will slightly reduce unity since it divides an otherwise continuous viewscape and clashes with other man-made elements.

Overall, visual quality of View 4 is partially degraded due to very slight reduction in vividness and slight reduction in intactness and unity.

View 5. The view is rated as moderately highly vivid: it is high in boundary definition, division of spatial enclosure and topographical relief, and moderate in other vividness criteria. The SDB Facility will slightly reduce vividness by reducing the diversity of spatial enclosure and the vividness of man-made elements (by removal of the boathouse).

The view is rated as moderately highly natural (slightly less than from view 4). The SDB Facility will slightly decrease the intactness since the cut is slightly visually disturbing.

Moderately high unity is achieved due to the horizontal balance of man-made elements in the viewscape and their architectural similarity. The SDB Facility will slightly reduce the unity by notching a straight coastal bluff line and since the facility slightly clashes with the other man-made elements.

Overall, visual quality will be partially degraded due to a very slight decrease in the intactness and slight decreases in vividness and unity.

4.3 Nonelimination of the Boathouse option. The boathouse plays an important role in the aesthetics of the area. It is impossible that the SDB Facility could be built without its elimination. The aesthete's consequences of retaining this structure at or near its present location and orientation are described below.

The aesthetic quality from View 1 will be slightly degraded since both the vividness and intactness will be reduced. From View 3 there will be no impact on visual quality since decreases in intactness are balanced by increases in vividness. From views, 4 and 5 the aesthetic quality will be enhanced since decreases in intactness are more than compensated for by gains in vividness and especially in unity.

Since the majority of observers will see the area from views 3, 4 and 5, there is a slight aesthetic advantage to retaining the boathouse (see also Section 4.4).

4.4 Aesthetic Analysis Limits. As previously noted, the analytical technique used to analyze changes in visual quality may be subjected to judgmental criticism.

The analysis covers all observation points currently available to the public. It does not consider contact points possibly available to the future public in case of a decommissioning of the southern portion of Vandenberg AFB.

It is assumed that upon decommissioning or abandonment of the area, sufficient measure would be taken to insure permanent integrity of the facility.

Assessment of the nonelimination of the boathouse option did not consider observers directly on or near the structure. Elimination of the structure will have adverse effects on the aesthetics only in the immediate area and will eliminate unique observation points, which afford views of significant aesthetic quality.

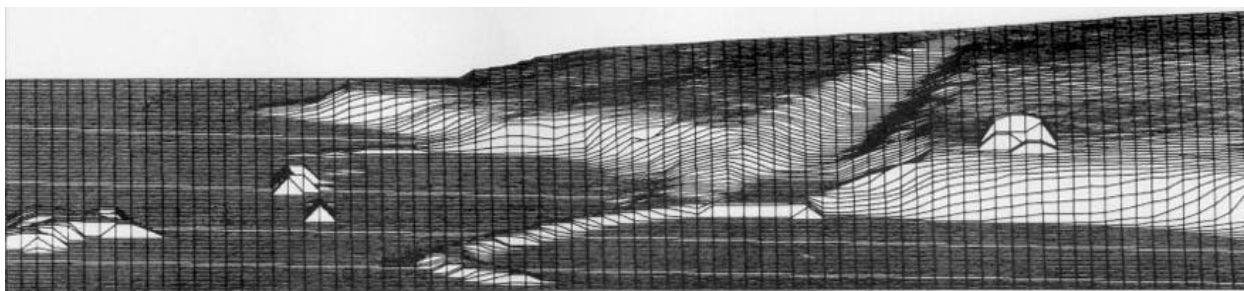
The Shallow Draft Barge was not considered in the detailed aesthetic analysis since it is not a permanent feature of the facility. Based upon the computer drawings, it is felt that while the SDB is in place (5 days per year) at the facility it will slightly degrade the aesthetic value of the area.

TABLE I

The table below summarizes the aesthetic impacts and limits to the aesthetic analysis.

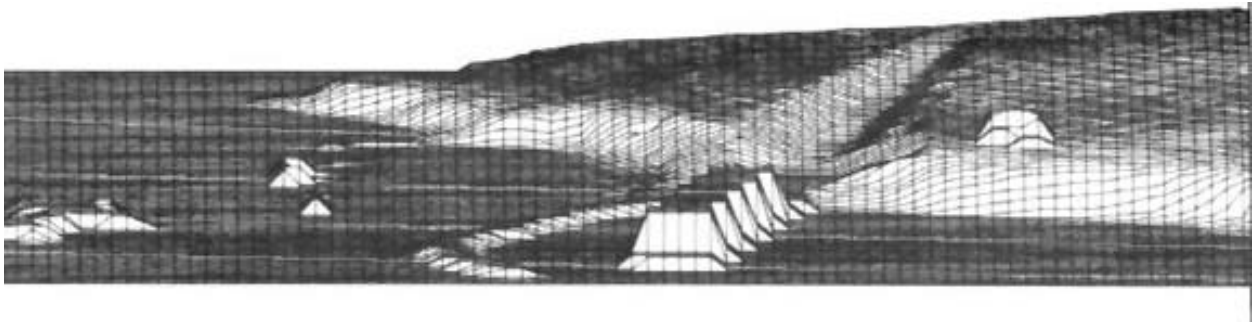
Observation Point	Observer Contacts	Impact on Visual Quality	Elements Not Considered in Analysis
Public Highways	None- inaccessible To public	None	Future accessibility
Trails	None-inaccessible To public	None	Future accessibility
Trains	1,136 passengers/ day- barely visible from this viewpoint	None	
Beaches: View 1	Very Few- difficult Accessibility	None (degradation enhancement)	Future accessibility, ·Nonelimination of boathouse
Jalama Beach County Park	635 people/ day- barely visible from this viewpoint	None	
Pleasure craft: View 3	Less than 25 craft/ day	Degradation	SDB docked, nonelimination of boathouse
View 4	Less than 25 craft/ day	Partial degradation	SDB docked, nonelimination of boathouse
View 5	Less than 25 craft/ day	Partial degradation	SDB docked nonelimination of boathouse
Commercial ships	13 ships/day-barely visible from this viewpoint	None	Shipping lanes moved shoreward
Aircraft	None- restricted air space	None	Future accessibility

VCR-76-055

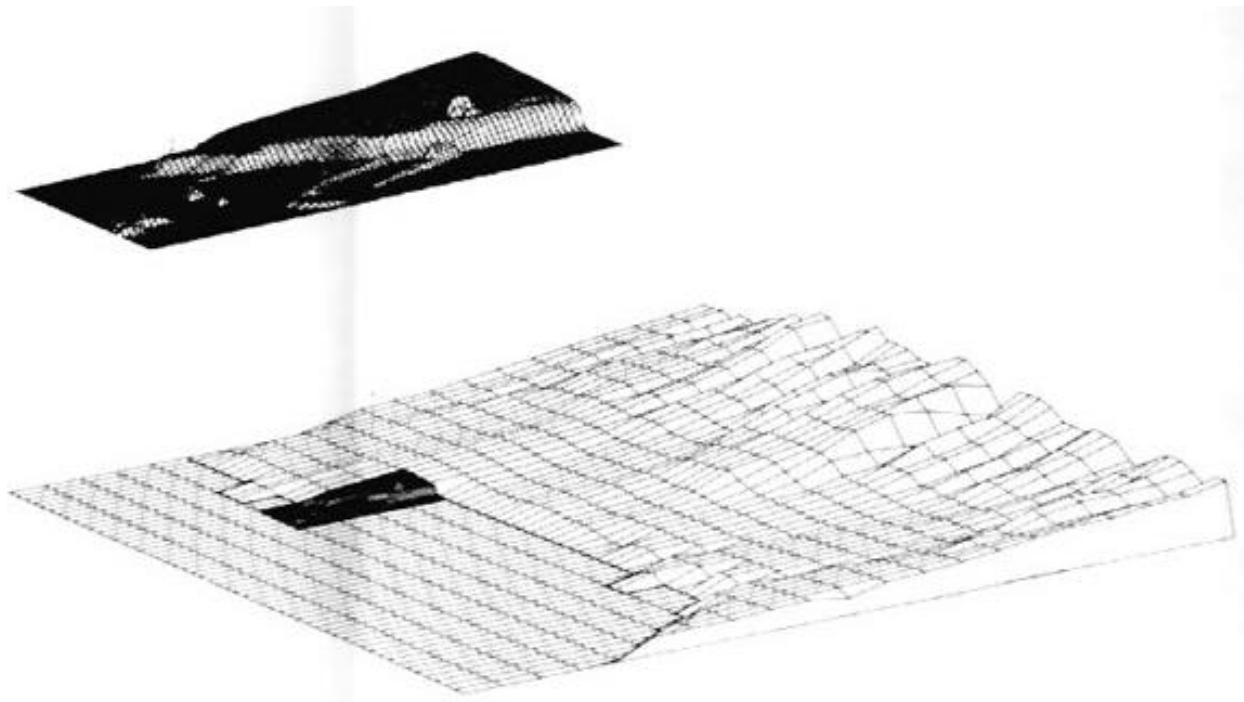


**FIGURE 8. COMPUTER PLOT OF POINT ARGUELLO BOATHOUSE WITH SDB
FACILITY, AERIAL VIEW**

VCR-76-055



**FIGURE 9. COMPUTER PLOT OF POINT ARGUELLO BOATHOUSE WITH
DOCKED SDB**



**FIGURE 10. COMPUTER PLOT OF BOATHOUSE, AERIAL VIEW, WITH
BACKGROUND**

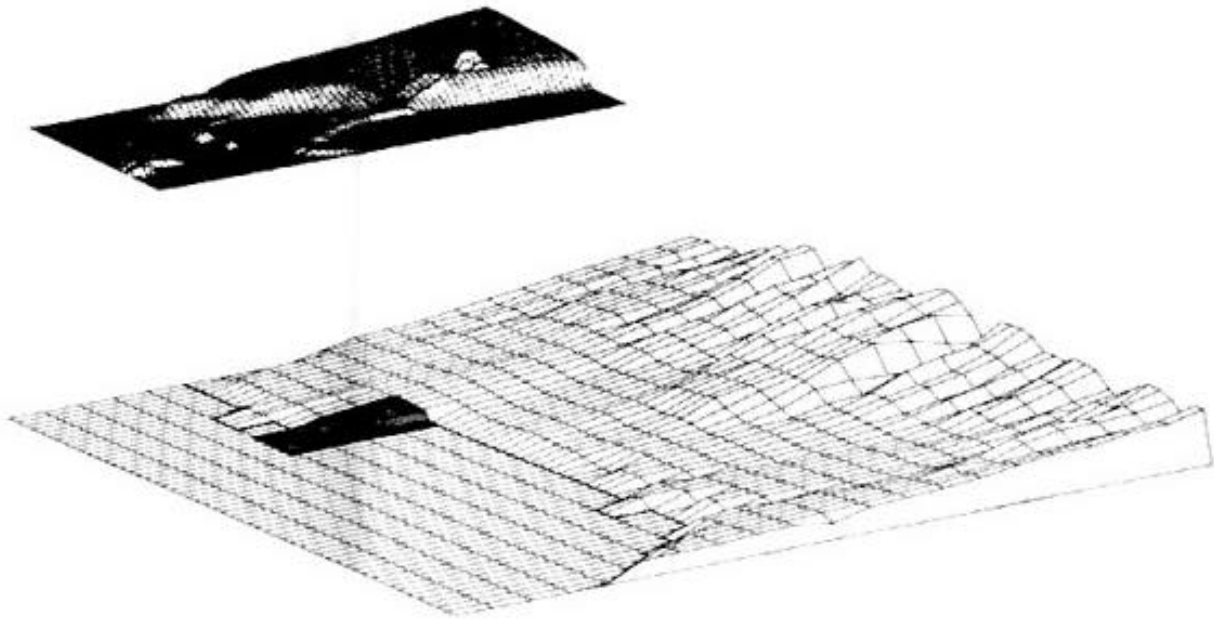


FIGURE 11. COMPUTER PLOT OF BOATHOUSE WITH SDB FACILITY, AERIAL VIEW, WITH BACKGROUND

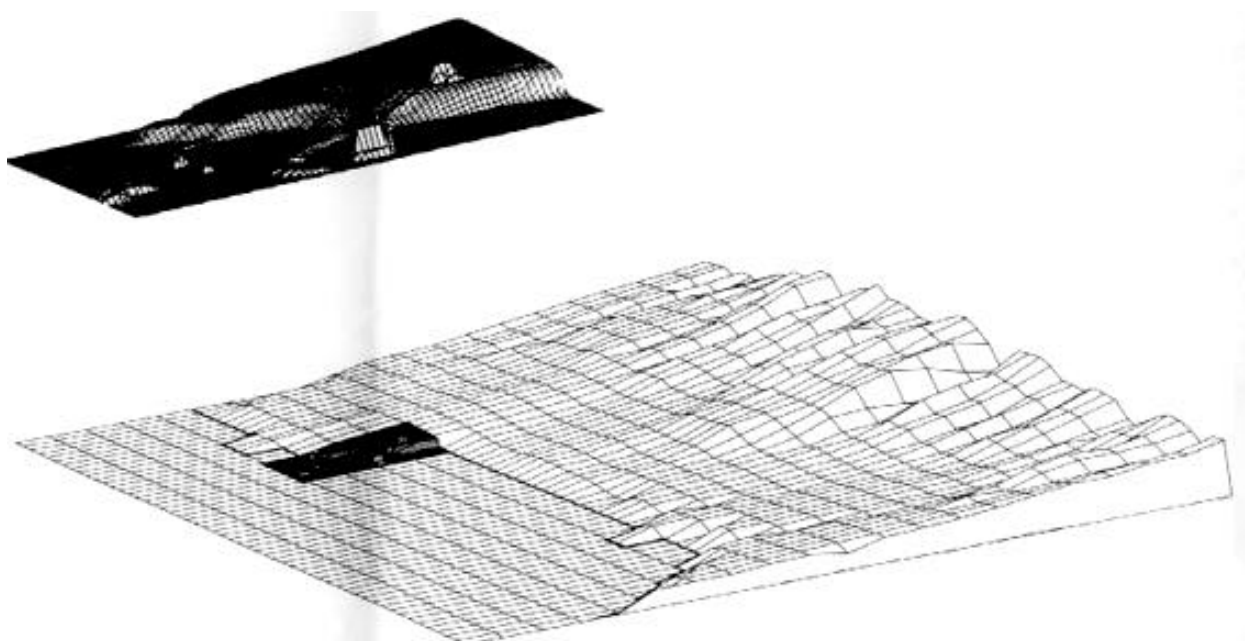


FIGURE 12. COMPUTER PLOT OF BOATHOUSE WITH DOCKED SDB, AERIAL VIEW, WITH BACKGROUND

VCR-76-055

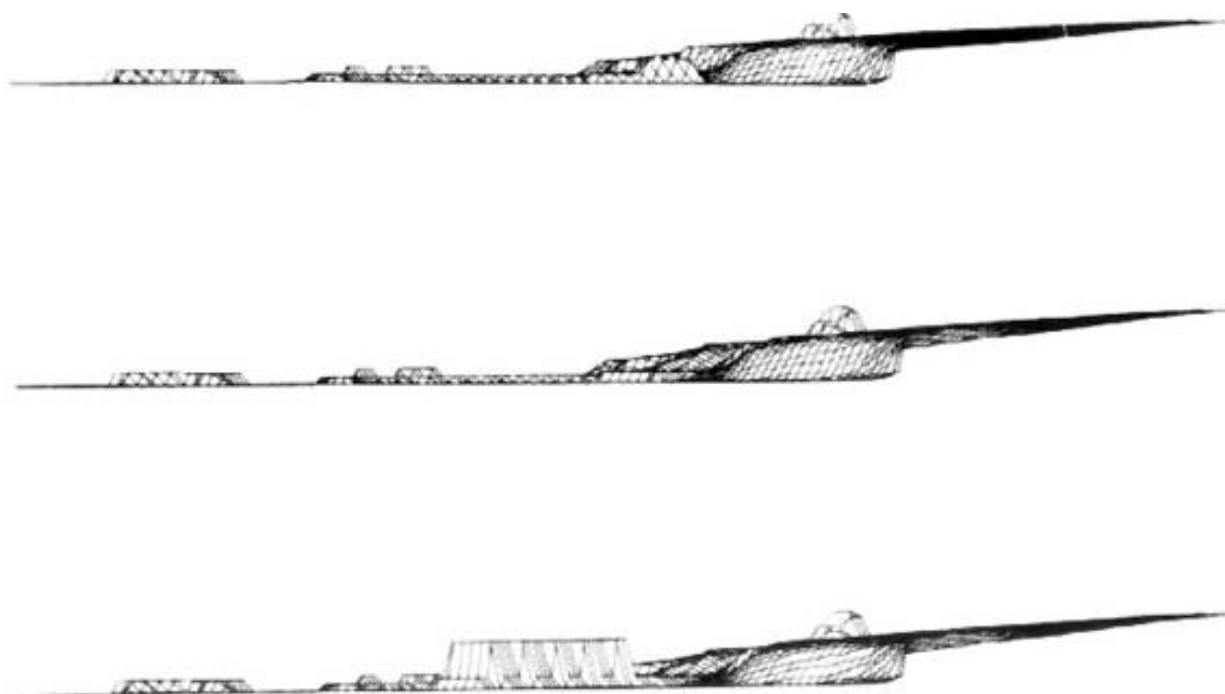


FIGURE 13. VIEW FROM 1

VCR-76-055

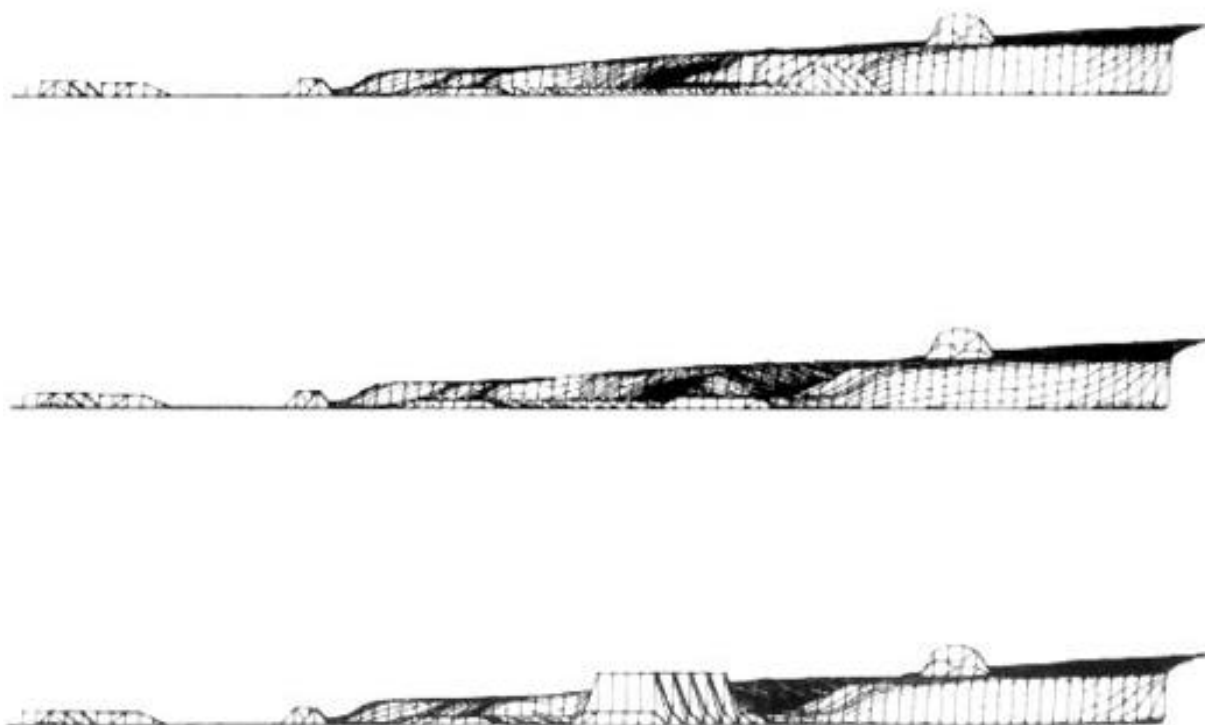


FIGURE 14. VIEW FROM 2

VCR-76-055

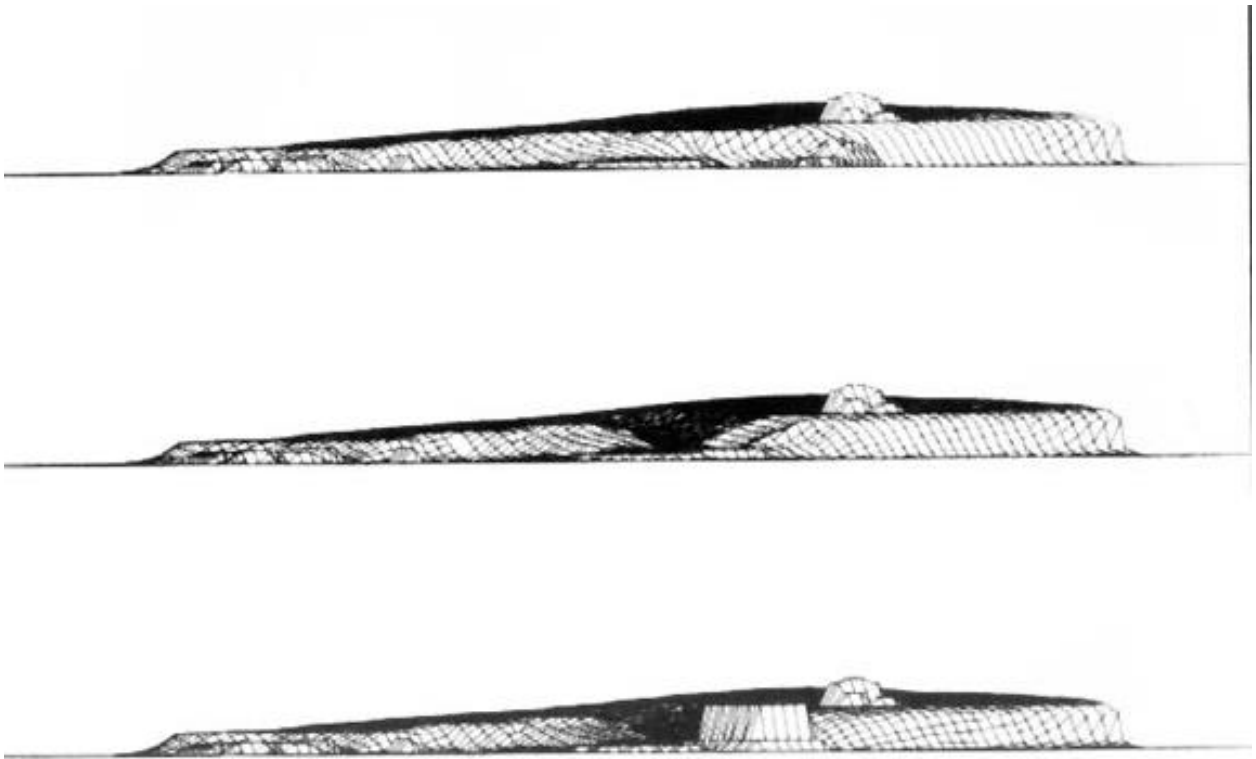


FIGURE 15. VIEW FROM 3

VCR-76-055



FIGURE 16. VIEW FROM 4

VCR-76-055

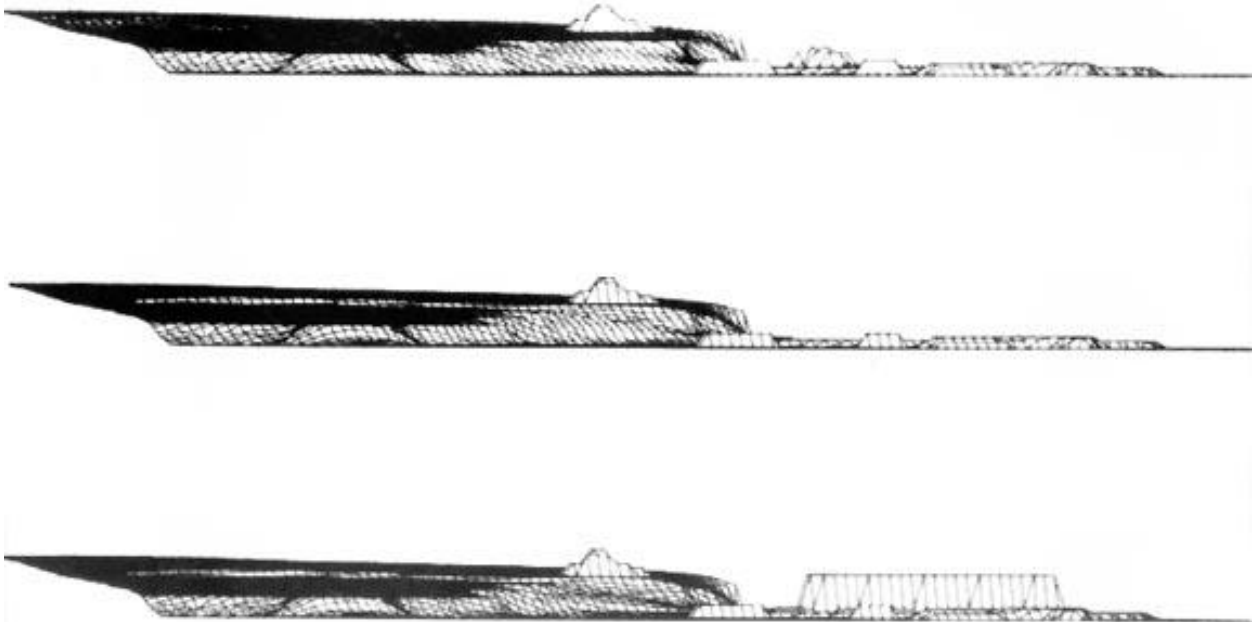


FIGURE 17. VIEW FROM 5

VCR-76-055

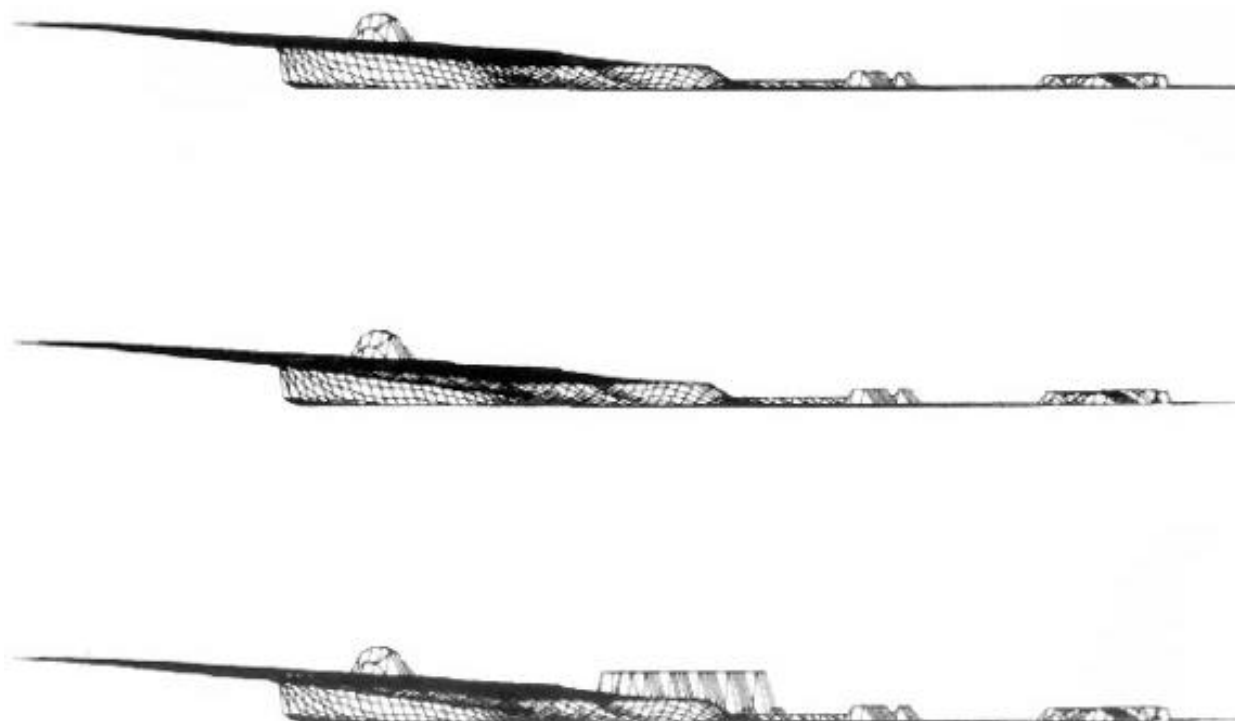


FIGURE 18. VIEW FROM 6

VCR-76-055

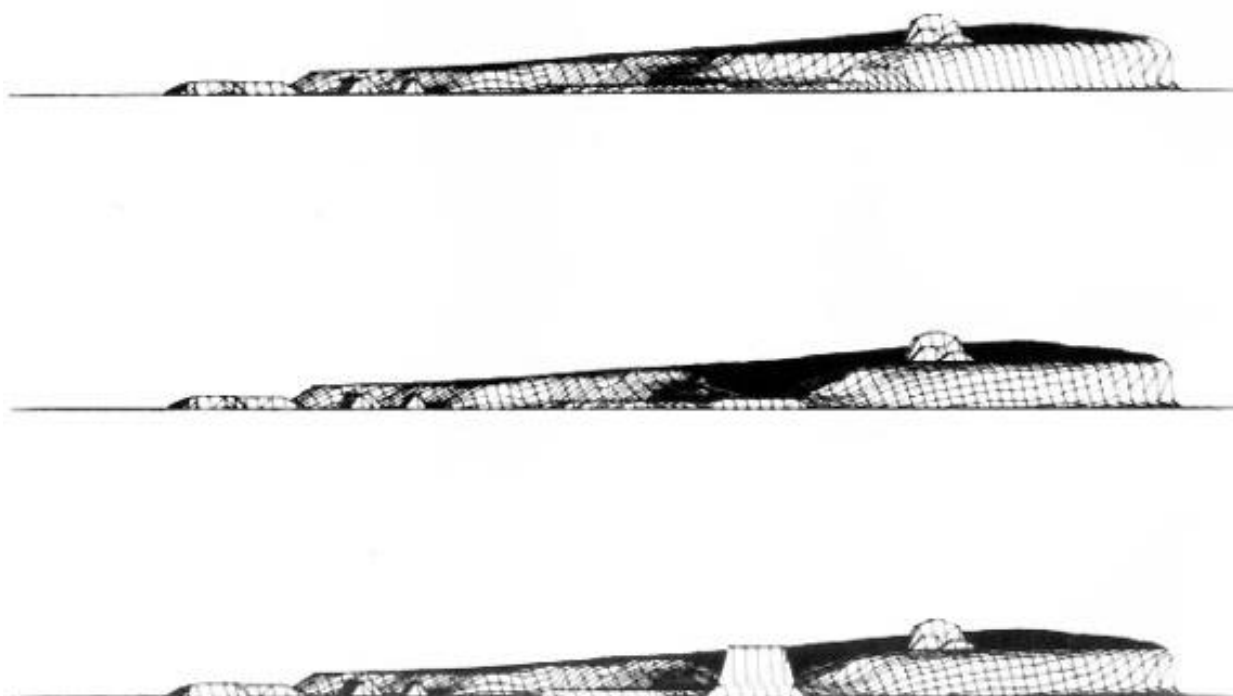


FIGURE 19. VIEW FROM CUT CENTERLINE

VCR-76-055

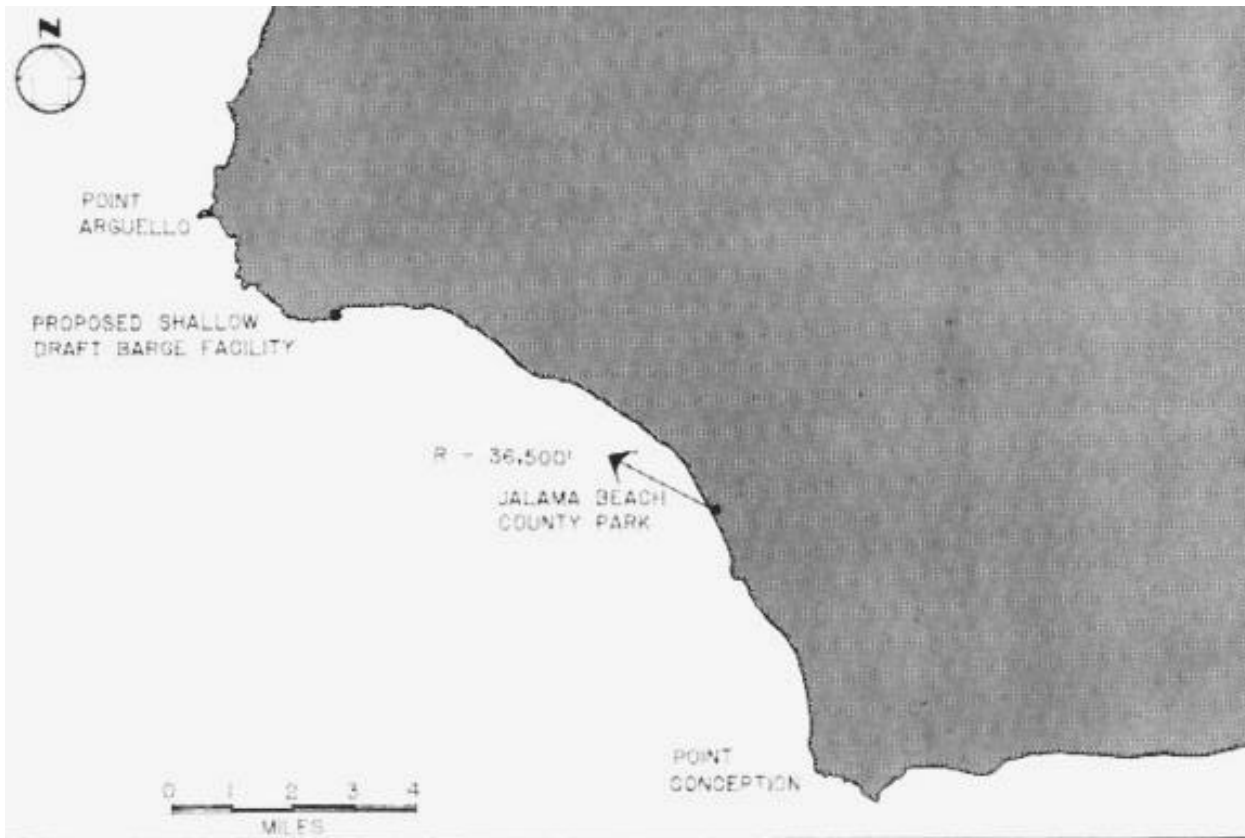


FIGURE 20. JALAMA BEACH VIEWPOINT

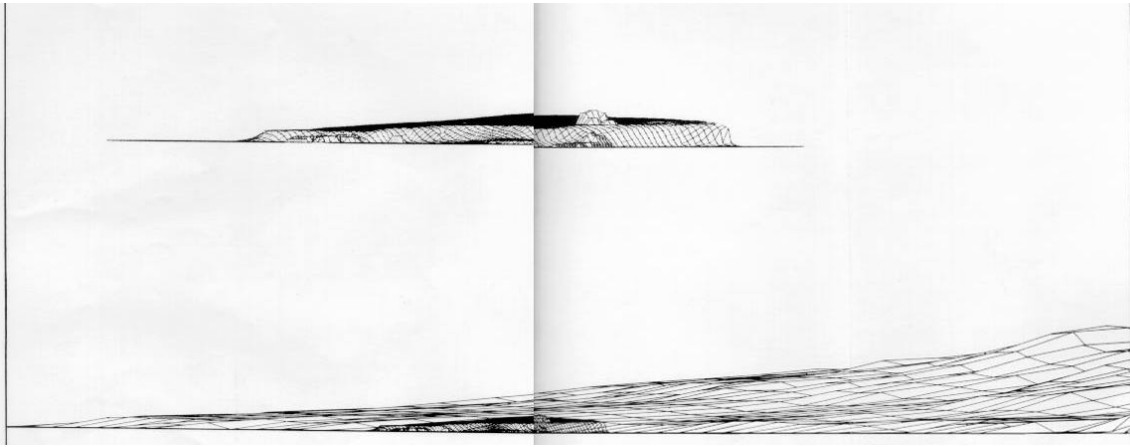


FIGURE 21. VIEW OF BOATHOUSE FROM JALAMA BEACH, COMPUTER PLOT

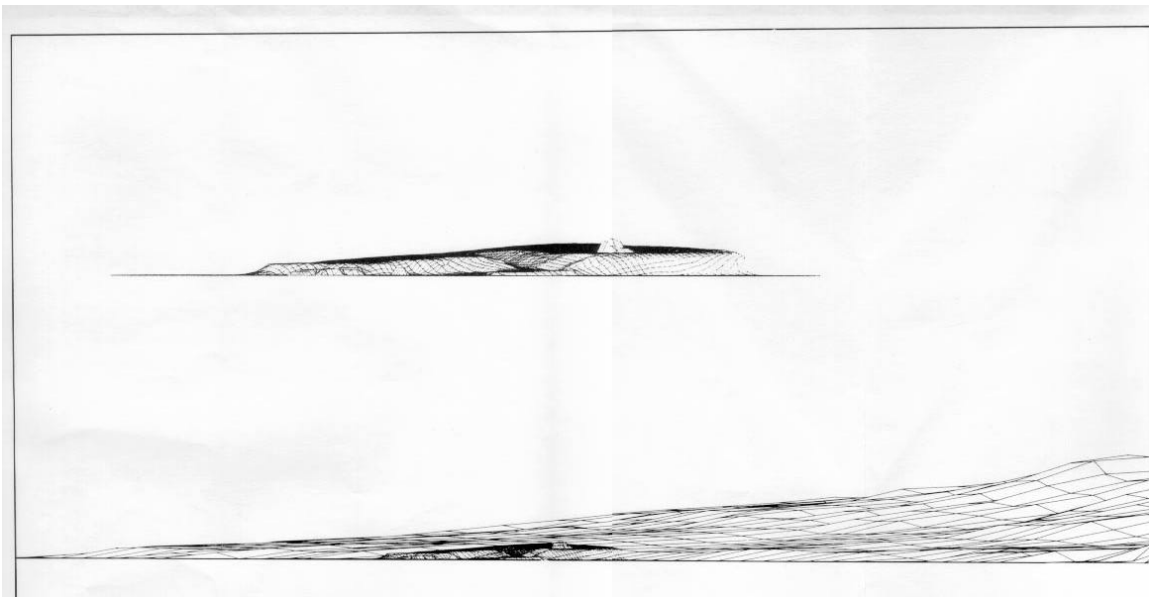


FIGURE 22. VIEW OF BOATHOUSE WITH SDB FACILITY FROM JALAMA BEACH, COMPUTER PLOT

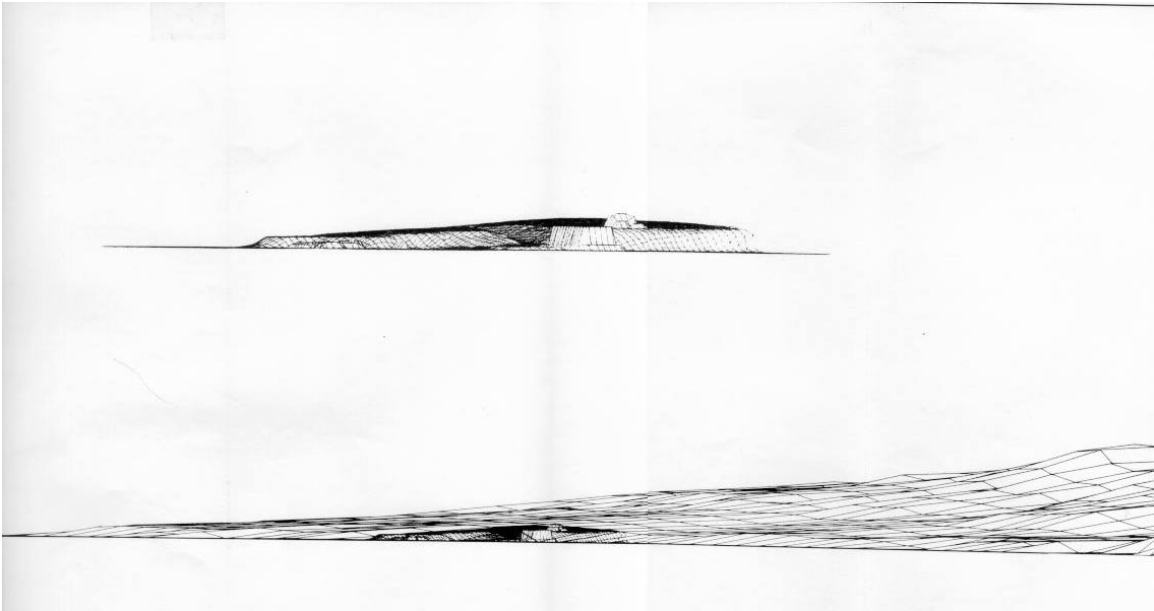


FIGURE 23. VIEW OF BOATHOUSE WITH DOCKED SDB FROM JALAMA BEACH, COMPUTER PLOT

VCR-76-055



ELEVATION=0 FEET



ELEVATION=75 FEET

**FIGURE 24. VIEW OF BOATHOUSE (ARROWS) FROM JALAM BEACH,
PHOTOGRAPHIC**

VCR-76-055

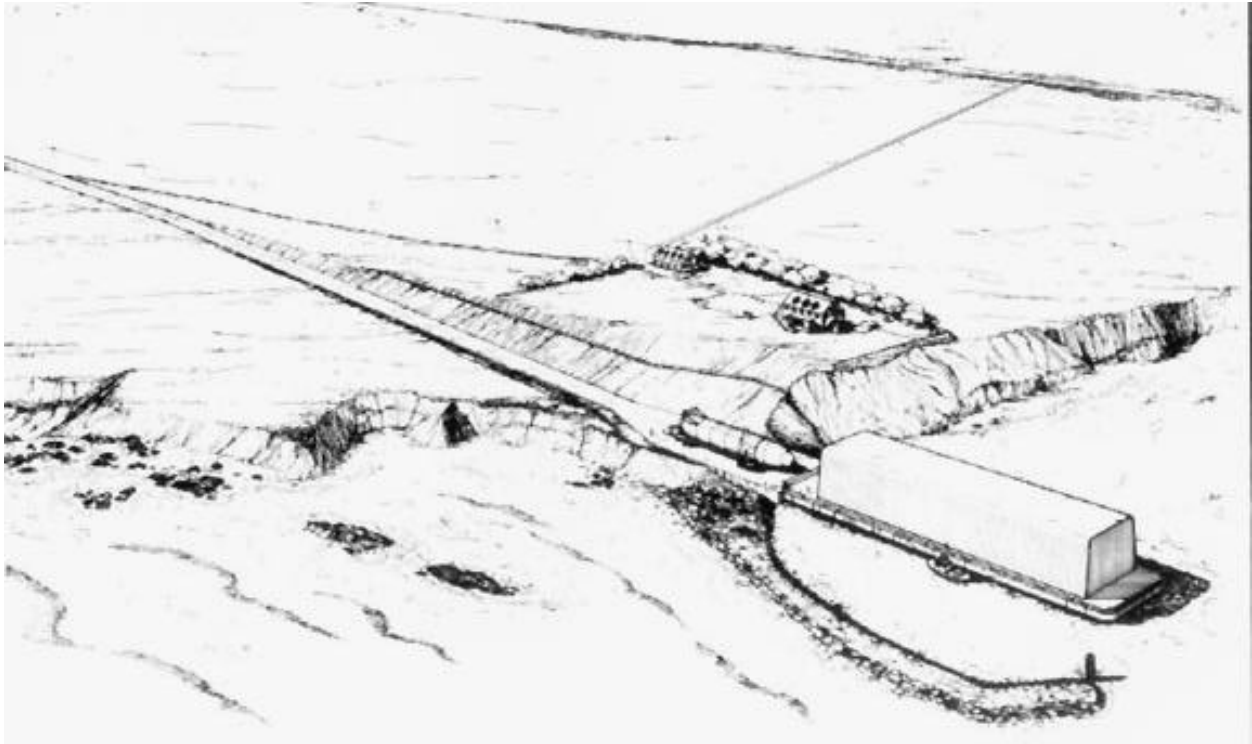
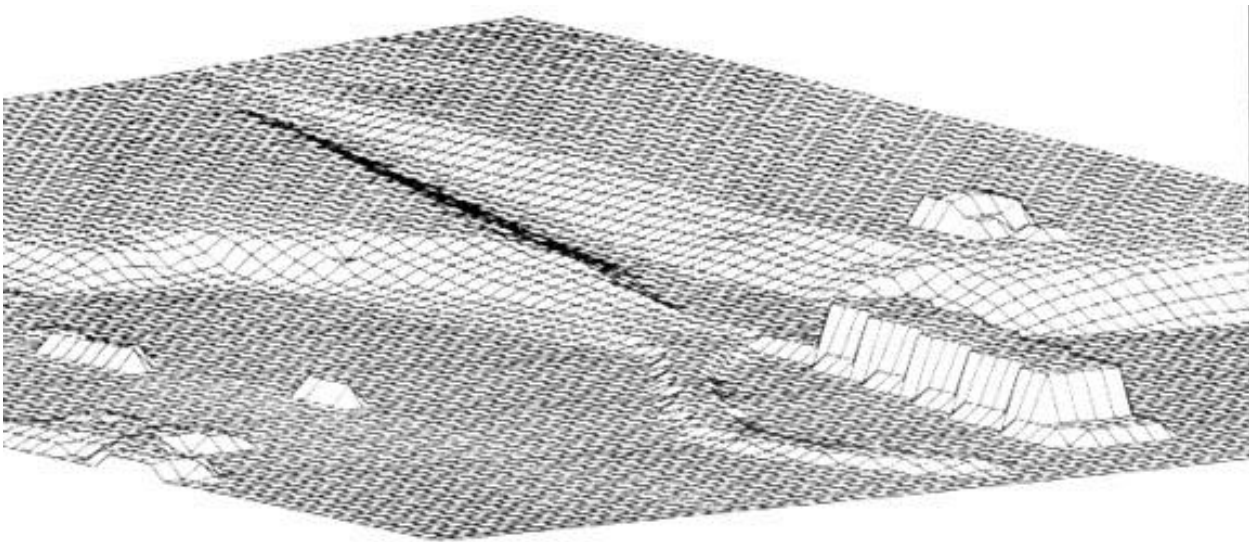


FIGURE 25. ARTIST'S RENDERING OF BOATHOUSE WITH SDB DOCKED

VCR-76-055



**FIGURE 26. COMPUTER PLOT OF BOATHOUSE WITH SDB DOCKED, FROM
ARTIST'S RENDERING VIEWPOINT**

VCR-76-055



FIGURE 27. PHOTOGRAPH OF EXISTING BOATHOUSE FROM VIEW 1

VCR-76-055



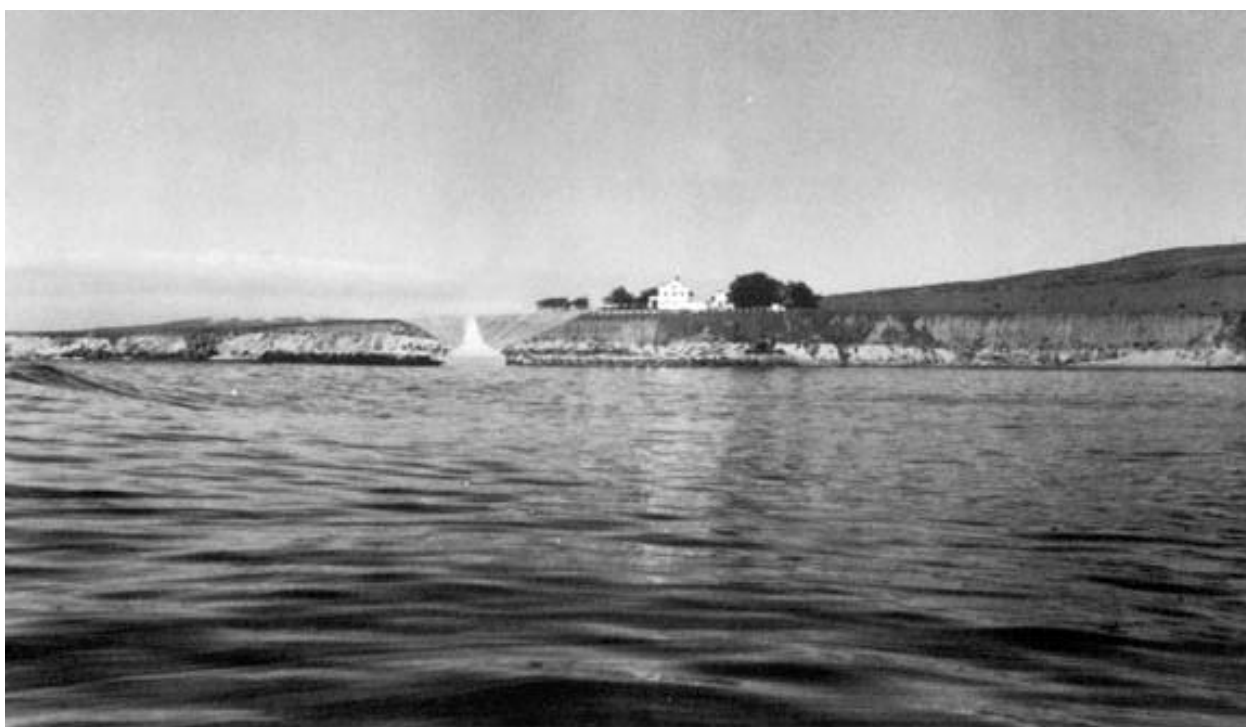
**FIGURE 28. RETOUCHE PHOTOGRAPH SHOWING BOATHOUSE WITH SDB
FACILITY FROM VIEW 1**

VCR-76-055



FIGURE 29. PHOTOGRAPH OF EXISTING BOATHOUSE FROM VIEW 3

VCR-76-055



**FIGURE 30. RETOUCHE PHOTOGRAPH SHOWING BOATHOSE WITH SDB
FACILITY FROM VIEW 3**

VCR-76-055



FIGURE 31. PHOTOGRAPH OF EXISTING BOATHOUSE FROM VIEW 4

VCR-76-055



**FIGURE 32. RETOUCHE PHOTOGRAPH SHOWING BOATHOUSE WITH SDB
FACILITY FROM VIEW 4**

VCR-76-055



FIGURE 33. PHOTOGRAPH OF EXISTING BOATHOUSE FROM VIEW 5

VCR-76-055



**FIGURE 34. RETOUCED PHOTOGRAPH SHOWING BOATHOUSE WITH SDB
FACILITY FROM VIEW 5**

5.0 MITIGATION MEASURES

5. MITIGATION MEASURES

The following were considered measures to reduce aesthetic degradation of the boathouse area resulting from the SDB Facility.

- a. Use colors additives in the concrete pad and ramp, which blend with the surroundings.
- b. Erosion control techniques shall be employed to prevent postconstruction degradation of the cut slopes. The techniques used should blend in with the surroundings. Aggressive plants, which could choke out native vegetation in surrounding areas (such as Hottentot fig), shall not be used.
- c. Reducing the width of the docking and maneuvering pad to the absolute minim required for safe clearance of the ET and ET transporter during operations and reevaluation of clearances addressing the possibility of close tolerance alignment of the barge into position at the dock and maneuvering of the ET transporter within the barge.
- d. Nonelimination of the boathouse was not economically justified on the weight of aesthetic considerations alone, since the aesthetic gains of this option would be small. However, aesthetic gains would be considered only when the cost effectiveness of resiting is being evaluated for other criteria (e.g., preservation of historical resources).
- e. The desirability of providing a removable camouflage screen to span the gap in the bluff following ET delivery was explored, since such land scaping and structural covers have been successfully applied to aesthetic problems by the oil industry.

An example-camouflaging device consists of a system of removable cables to which a fabric sheet is attached. The fabric is painted to match the surrounding bluffs and has reinforced ventilation flaps to preclude wind damage. A preliminary design for this device is given in Figures 36 and 37. The system would be removable by release of the main suspension cable and subsequent disassembly. Reassembly would require a winch on one side of the bluff crest. This system would have to withstand prevailing winds.
- f. Follow-up series of postconstruction photographs produced to evaluate effectiveness of mitigation measure for possible response to interest participating agencies.

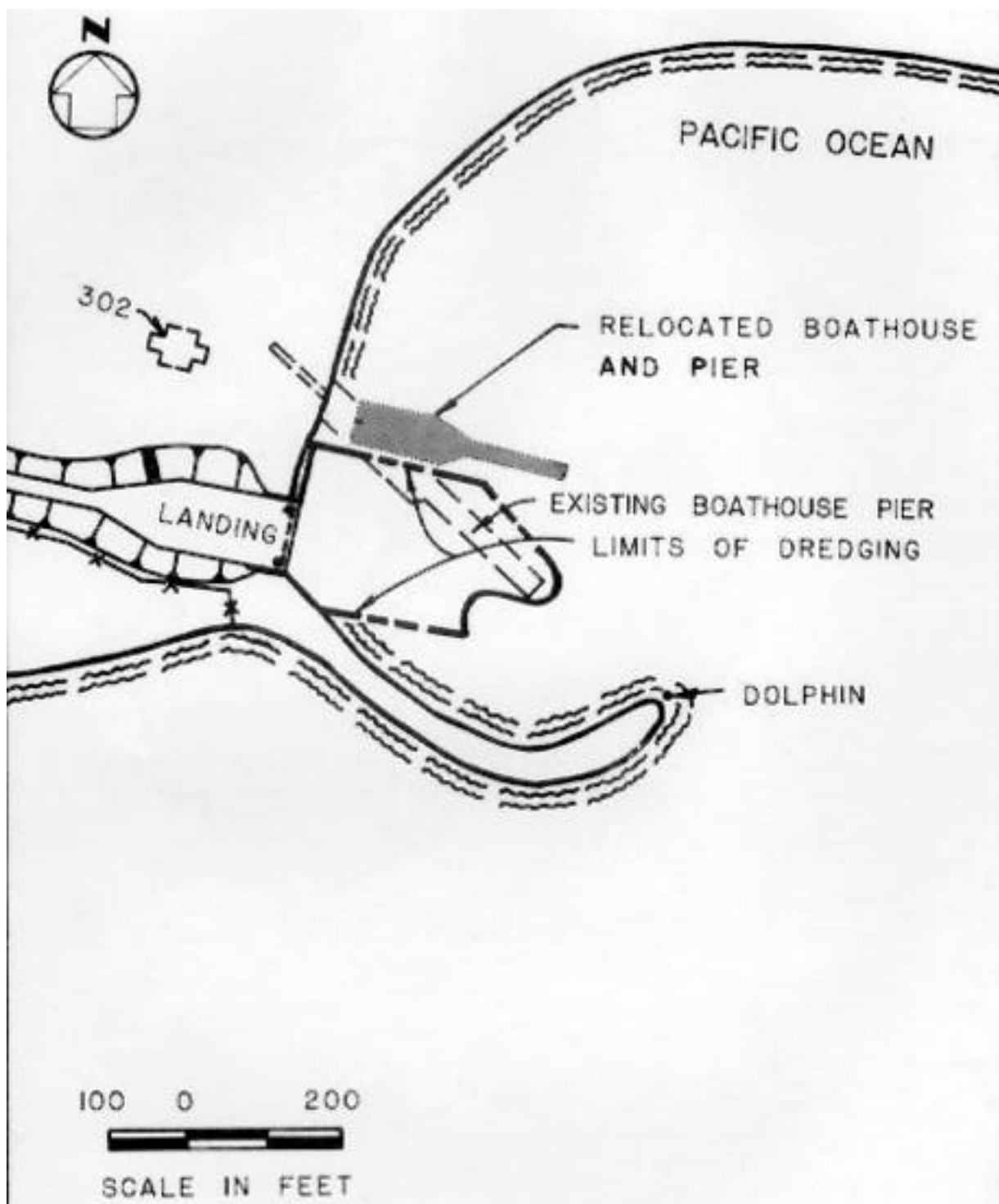
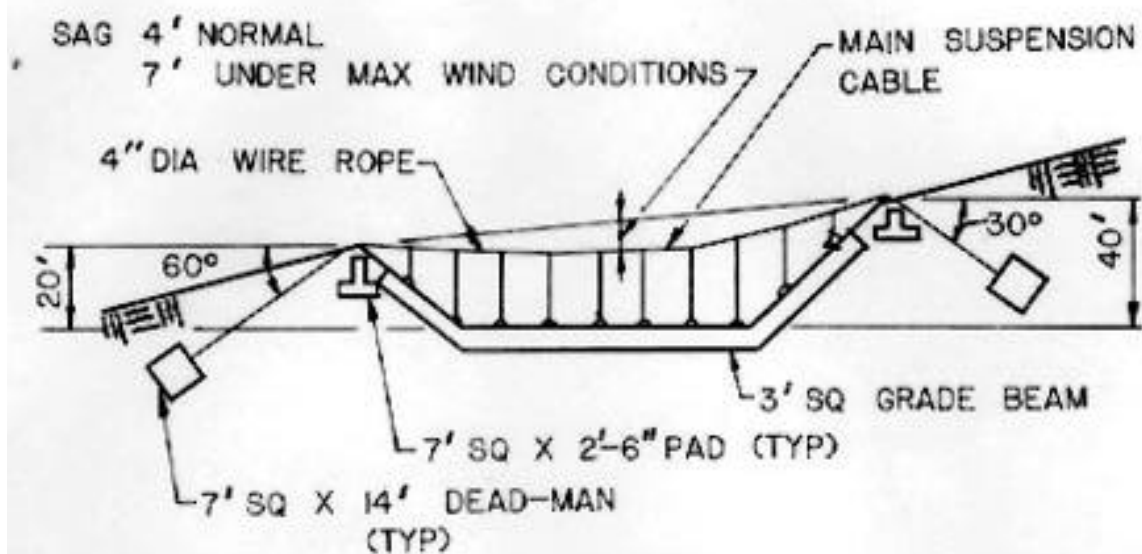
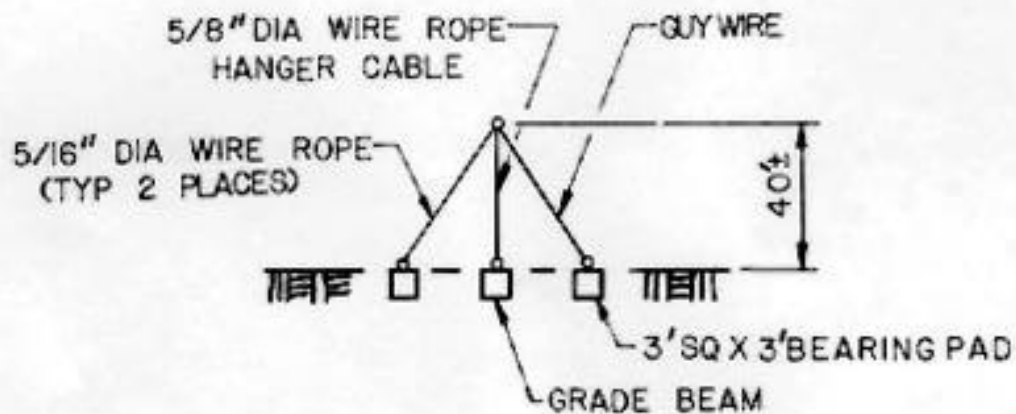


FIGURE 35. RELOCATION OF POINT ARGUELLO BOATHOUSE



SECTION A



SECTION B

FIGURE 36. SCREEN CAMOUFLAGE OF ET ACCESS ROUTE, SECTIONAL VIEWS

6.0 PERSONNEL CONTACTED

6. PERSONNEL CONTACTED

The following is a list of those who participated in various aspects of the analysis.

Topic	Source	Contact
A Visual Impact	California Coastal Commission, Santa Barbara, California	Mr. William Barry (805) 969-5828
B Aesthetics	University of California at Los Angeles, Department of Philosophy Jones and Jones Landscape Architects, Seattle, Washington	Mr. David Hills (213) 825-6045 Mr. Ken Caldwell (206) 624-5702
C Characteristics of Vision	University of California at Los Angeles, Department of Biology	Dr. Fredrick Crescitelli (213) 825-3185
D Computer Input Data Generation	The Ralph M. Parsons Company, Civil Engineering, Pasadena, California	Mr. Drazen Radosevic (213) 440-2000
E Three-dimensional Computer Programming Consultant	California Institute of Technology, Pasadena, California	Dr. William R. Goodin (213) 795-6811 ext. 1612
F Physical Constraints on Vision	The Ralph M. Parsons Company, Civil Engineering, Pasadena, California	Mr. Jim Chapman (213) 440-2000 Mr. Al Leavitt (213) 440-2000
G Pleasure Craft Operations	Raymond E. Wallace, Special Productions, Palos Verde's Estates, California U.S Coast Guard Safety. Long Beach, California	Mr. Raymond E. Wallace (213) 832-1316 Mr. Fouts (213) 590-2301
H Photography	The Ralph M. Parsons Company, Photo Lab, Pasadena, California Vandenberg AFB Field Representative	Mr. Steve Tom (213) 440-2871 Mr. Lee Freeman (805) 866-8792
I Photographic	Gerald Cook Studio, Los Angeles, California	Mr. Gerald Cook (213) 383-5337

Topic	Source	Contact
J Marine Transportation	Spike Gunnison Charters, Santa Barbara, California	Mr. Spike Gunnison
K Graphic Layout	The Ralph M. Parsons Company, STS Environmental Quality Group, Pasadena, California	Ms. Lynne Reardon
L STS Environmental Coordinator	United States Air Force, Space and Missile Systems Organization, El Segundo, California	Lt. Col. Earl Jones, Jr. (213) 643-0933 Maj. R.C. Wooten (213) 643-0933
M Aesthetic Analysis Management and Production	The Ralph M. Parsons Company, STS Environmental Quality Group, Pasadena, California	Mr. Martin Fabrick (213) 440-2000 Mr. John Edwards (213) 440-2000
N Screen Camouflage Design	The Ralph M. Parsons Company, Structural Engineering, Pasadena, California	Mr. George Pu (213) 410-2000

7.0 REFERENCES

7. REFERENCES

- (1) "The National Environmental Policy Act" (Public Law 91-190, 1970).
- (2) The California Coastal Act of 1976.
- (3) "A method for Quantification of Aesthetic Values for Environmental Decision Making", Nuclear Technology, Vol. 25, No. 4, April 1975.
- (4) Ashford, F.C, The Aesthetics of Engineering Design, Business Books Ltd., London, 1969.
- (5) Beardsley, M.C., Aesthetics from Classical Greece to the Present, The Macmillan Company, New York, 1966.
- (6) Berlyne, D.E., Aesthetics and Psychobiology, Appleton-Century-Crofts, New York, 1971.

APPENDICES

APPENDIX A

AESTHETIC CRITERIA

Over the past 2,400 years, some of the best minds known to history have grappled with the problems of identifying the essential qualities of a static scene, which render it pleasing or displeasing to an observer. Plato concluded that aesthetically pleasing results require care in the making and proper proportions obtainable through mathematical measurement. St. Augustine felt that there must be completeness, while St. Thomas Aquines required that there be no broken parts, due proportion and harmony, and brightness or clarity. Edmund Burke felt that we are attracted to beauty (response to womanly beauty minus the lust) and to the sublime (response to the terrible minus the fear). William Hogarth felt that beauty requires uniformity, variation and simplicity (5).

The list of qualities grew until about 50 years ago when aesthetic philosophers concluded that aesthetic qualities could not be usefully systematized in any such simple way, and turned to questions concerning the nature of criticism and why people bother with providing a special sort of experience, namely art (B).

Psychologists in the meantime sought to distill out the important aesthetic qualities experimentally (6). However, even the aesthetic measures of simple geometric forms are not generally applicable, much less the more complex interrelationships between irregular forms, color, and their arrangements within a scene. Hence, no generally agreed upon criteria for aesthetic quality have yet been developed in philosophy or psychology.

Industry must assess aesthetic impacts in order to conscientiously respond to environmental needs while developing projects which alter, among other things, the aesthetic quality of the environment. The most applaudable tract taken to date consists of opinion surveys based upon before and after pictures of a project site. Development of aesthetic criteria (interestingly similar to those of philosophers) sought to lend some objectivity to the survey results. Surveyed results using more detailed aesthetic criteria are reported to converge on certain values, but whether this represents more objectivity or simply greater focusing of attention on arbitrary traits of a viewscape is not known. In developing aesthetic criteria, industry faces the dilemma of ancient philosophers: simple criteria require as much interpretation as the total aesthetic effects and more detailed criteria require weighting between the numerous parts --a subjective endeavors. Underlying all criteria development and survey responses, we are likely to find the tastes of the age and culture.

The aesthetic criteria used in this analysis are described below. Although they may not be universally applicable, they are the best available at this time. The quantified observation, or contact, point weighting of results was not used for this analysis since it tends to show less impact in less frequently observed areas, which are often the most undeveloped and aesthetically sensitive.

There are three main aesthetic criteria used to analyze a viewscape: vividness, inactness, and unity. These criteria are equally weighted during analysis. A definition and detailed discussion of each criterion extracted from a Nuclear Technology article (3) follows.

Vividness

Vividness is the memorability of the visual impression received from the viewscape or its elements. Vividness relates to the level of distinction resulting from contrast of diverse viewscape elements. Eight complementary effects are defined.

1. Definition of viewscape boundary. The viewscape boundary is the furthest visible limit of land reform, water form, or vegetation that acts as the skyline boundary for the viewscape. Viewscapes with strongly defined visual walls and with distinct or irregular skyline, profiles that are clearly legible and memorable are more vivid than viewscapes with poorly defined, indistinct, and hazy skyline boundaries. Jagged ridgelines and mountain peaks from highly distinct and legible middleground and background boundaries of the viewscape, while skyline edges of the forest or lower vegetation can clearly and distinctly define the viewscape boundary in the foreground and middleground. Smooth, regular skyline profiles are less distinct. Skyline boundary definition is very low where there is no legible distinction of skyline at all. Man-made elements can reduce the definition of a viewscape boundary by removing a portion of the boundary element or by blocking a portion of the element from view.

2. Diversity of spatial enclosure. The skyline boundary may be only one of many elements in the viewscape that encloses space. There may be other viewscape spaces, the overlapping walls of which are partly visible, e.g., views of consecutive ridges and valleys, or views with glimpses of several clearings within a wooded valley. A high diversity of spatial enclosure normally enhances the visual quality of a viewscape. This type of viewscape takes on another dimension, holding the observer's visual interest for longer periods than viewscapes in which every element and every space is immediately and readily seen and understood. Spatial enclosure is often more diverse as the number and configuration of vertical elements increases, as the overlapping vertical or sloping planes weave space between elements of the viewscapes.

Overlapping planes may be formed by vegetation, landform, and/or by man-made elements. However, man may also simplify or remove spatial definitions of landform and vegetation to convert the land to his own purposes.

3. Degree of topographic relief. The visual perception of topographic relief will often enhance the quality of a viewscape, adding to its vividness. The visual stimulation received from viewscape of mountains, hillsides, or canyons is often higher than that received from viewscapes of nearly flat terrain. However, contrast between flat and high, steep or deeply incised terrain can also add to the visual perception of topographic relief. Man-made elements seen in the middleground (or foreground) may affect the observer's perception of the true size of landscape elements.

They can block the observer's view and/or make landforms or differences in topographic relief seem smaller than they really are.

4. Diversity of vegetative pattern. Pattern is formed at the edge between two major types of vegetation, as between forest/shrubland/grassland/barren surfaces. Pattern can also exist within a major vegetation type and can be expressed as variation of from degrees of contrast and distinction or irregularity of vegetative edge and profile. Man's alterations nearly always influence vegetative pattern, sometimes increasing its diversity (e.g., increasing the length and configuration of vegetative edges, when creating alternate clearings, woodlots, and hedgerows) and sometimes decreasing vegetative diversity (e.g., removing or simplifying the existing patterns, when totally clearing forests and planting one single crop throughout, or by paving once-vegetated land).

5. Prominence of natural features. Prominent natural features and natural landmarks nearly always increase the vividness of a viewscape. Prominent natural landmarks nearly always increase the vividness of a viewscape. Prominent natural features include those of land reform (distinctive mountain peaks, volcanic cones, gorges and canyons, or striking rock outcrops), vegetation (distinctive groupings of rare or specimen trees, a single majestic oak or a lonely, tenacious, windswept tree atop a rocky bluff), or water (waterfalls, geysers, glaciers, rapids, or springs), or combination of these. These striking and memorable natural features may owe their prominence to their uniqueness, isolation, distinctive profile, size/scale domination, or contrast with the surrounding viewscape elements. Man-made elements may visually compete with these natural features for attention, or may visually attract attention by complementing them. The vividness of natural features may be visually obscured or physically altered by man's actions or their vividness may be enhanced through careful design restraint.

6. Prominence of water forms. Water prominently displayed nearly always enhances the vividness and visual quality of a viewscape. Prominence refers not only to the actual amount of water that is visible but also to the degree that water enhances the viewscape by its color, value, and texture; by the steepness, height, clarity, and definition of the shoreline edge; and by the complexity of the water form pattern as woven into the overall viewscape elements. Man's alterations to the viewscape may enhance or degrade the vividness of water forms, depending on the degree and design sensitivity of the alteration.

7. Vividness of sky. Since the sky is the most highly ephemeral natural element of the viewscape, its visual quality is difficult to evaluate. Yet in most viewscape, the sky is among the largest visual elements present. Although constantly changing, various moods or types of skies are frequently associated with particular regions or areas of the country; e.g., cloudy, drizzling skies of the Pacific Northwest, clear, crisp skies of Eastern Washington and Oregon, silent fogs of San Francisco, or hazy orange smog's of Los Angeles. Assuming that each viewscape sky represents a relatively consistent condition, evaluation of vividness should take into consideration its clarity, depth, contrasts of color and cloud pattern textures, and its prominence or memorably in the viewscape. Man's effects on the vividness

Of the sky can include visual competition, visual blockage, or the results of air pollution.

8. Vividness of man-made element. Buildings, bridges, dams, water towers, power lines, roads, and parking areas may or may not be highly vivid in the viewscape, depending more on their contrast, diversity, prominence, and level of visual distinction within the overall viewscape than on their size or number (as measured by inactness).

Intactness

The inactness of a viewscape is a measure of its apparent degree of natural condition as judged by its level of urbanization and the degree to which encroachment is present. One viewscape may display a very high degree of man-made development with very little visual disturbance (as in a well-designed, carefully maintained urban setting), while another may display a very high degree of visual disturbance and alteration with little apparent man-made development (as in a forested area recently devastated by fire). Hence, it is important to gauge the intensity of development along with the severity of visual disturbance and alteration when measuring the overall inactness of a viewscape.

Overall, intactness is likely to be scored somewhere between the scores for level of urbanization and degree of encroachment.

1. Level of urbanization is a measure of the apparency or presence of man-made development in the viewscape. The two extremes are immediately recognizable: views of apparently undisturbed landscapes devoid of roads structures or any sign of human settlement or activity as opposed to views of highly urban centers and dense industrial complexes.

2. Degree of encroachment is a measure of the presence or absence of undesirable, visually disturbing elements in the viewsapes. Encroachment includes such visual disturbances as garbage heaps, junk yards, trash and/or litter, confusing and inharmonious signs and billboards, mazes of overhead wires, the sources or visual results of air or water pollution, as well as the apparent level of man's physical alteration or visual obscurity of sky, land, or water forms, as by strip mining, clear cutting, road cuts/fills, wet land or shoreline filling or alterations, diking, rip-rapping or culverting of streams or rivers, or visual intrusions and unhealed scars in the viewscape. Also included is any obvious effect of natural catastrophes such as the visual disturbances caused by fire, flood, or earthquake.

Unity

Unity is a measure of the degree to which individual elements in the viewscape join together to form a single, coherent, and harmonious visual unit. Unity refers to the compositional harmony or inter-compatibility of the individual elements that comprise the viewscape. Unity does not require similarity or blandness of interrelated elements; rather, it depends on an organized balance between visually dominant and subordinate viewscape elements. Vividness depends on visual contrasts and distinction between diverse viewscape elements, while unity quantifies their visual coherence

And compositional integrity. A viewscape of high visual quality is often likely to possess richness and diversity, making it highly vivid, while at the same time possessing a high degree of visual unity.

Overall, unity and the unity between man-made and natural elements are not necessarily the same as the level of urbanization or degree of encroachment, which together comprise viewscape inactness. Inactness is the relative degree of natural condition of the viewscape, while unity is indifferent to the degree of natural condition and is only concerned with visual integration of the viewscape composition.

A sample questionnaire from the survey on aesthetic impacts resulting from the SDB Facility is shown on page A6. This survey was conducted using the above criteria. A blank questionnaire form is included for the reader's independent evaluation.

Vividness	100=	very dramatic scene
	0=	totally undramatic, boring scene
Inactness	100=	totally natural condition, no development
	0=	totally developed area, no natural conditions
Unity	100=	maximum harmony between the parts (Similarity in form, line, color, and texture)
	0=	disharmonious, clashing

	<u>Before (B)</u>	<u>After (A)</u>
View 1		
Vividness	59	61
Intactness	80	82
Unity	70	66
View 2		
Vividness	47	49
Inactness	70	60
Unity	35	28
View 3		
Vividness	54	52
Inactness	75	72
Unity	58	55
View 4		
Vividness	60	57
Inactness	74	72
Unity	60	56

Visual assessment of boathouse area before and after SDB facility development.

Vividness	100=	very dramatic scene
	0=	totally undramatic, boring scene
Inactness	100=	totally natural condition, no development
	0=	totally developed area, no natural condition
Unity	100=	maximum harmony between the parts (Similarity in form, line, color, and texture)
	0=	disharmonious, clashing

	<u>Before (B)</u>	<u>After (A)</u>
View 1 Vividness Intactness Unity		
View 2 Vividness Inactness Unity		
View 3 Vividness Inactness Unity		
View 4 Vividness Inactness Unity		

Visual assessment of boathouse area before and after SDB facility development.

APPENDIX B
COMPUTER PROGRAM

Identification

THREED/Three dimensional plotting

Write-up by Albert F. Chang

Program date- May 1976

Write-up date-May, 1976

PURPOSE

This subroutine produces a perspective pictures of a three dimensional object represented by an array.

USAGE

Calling Sequence

CALL THREED (F, WA, NX, NXD, TITLE, NC, LAB)

Where

F = Real*four two dimensional array dimensioned NXD by NY.
 An NX by NY portion of this array is to be plotted.

WA= Real*four one dimensioned two*NX*NY provides working space for the subroutine.

NX, NY, NXD= Integer*four. NXD is the first dimension of the array F. NX and NY are the
 Dimensions of the portion of F to be plotted.

TITLE= contains EBCDIC title to be plotted below the figure independent of the value of LAB.

NC= number of characters in TITLE.

LAB= page control. LAB=0 implies plotting will not be terminated and successive calls to
 Plotting subroutines will cause plotting to be done on the current page. LAB≠0 implies
 Plotting will be terminated and next call to plotting subroutines will cause plotting to
 Be done on the next page.

The above simple CALL to THREED is sufficient for producing a 3-dimensional picture. The following options are provided to change the appearance of the figures.

C576-417-370

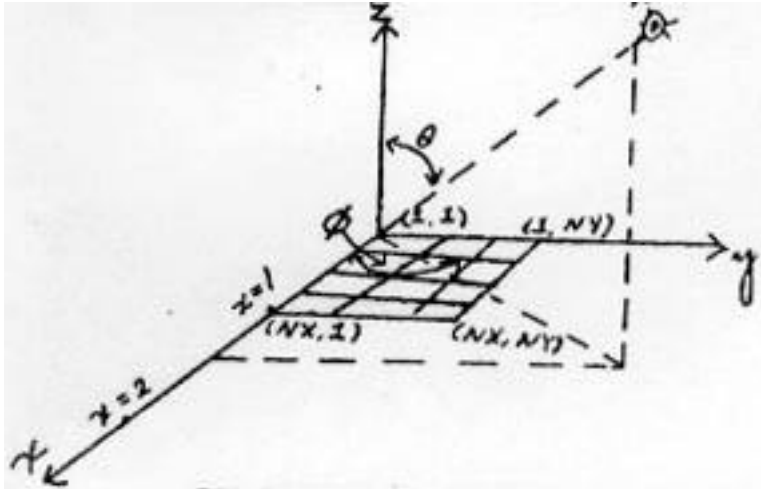
THREED

Page 1 of 3

1. To change the orientation of the line of sight, include the following common statement.

COMMON/IBALL/X, Y, Z, ISO

Where X, Y, Z are the coordinates of the position of the viewer. The following figure shows how the unit in x is defined.



Units in y and z are
the same as units
In x. In terms of the angles θ
and ϕ
and z are $y = x \cdot \tan \theta$ and $z = x \cdot \sec \theta \cdot \cot \phi$

ISO is a parameter, which determines the amount of perspective to be included in the figure. If ISO is greater than 50, the picture is essentially non-perspective.

2. To change the area of the plotting paper enclosing the picture includes the following common Statement.

COMMON/SIZE/XO, YO, WIDTH, HEIGHT, RATIO, SC

An area WIDTH inches by HEIGHT inches is used for the plotting. The lower left corner of this area is XO inches from the left edge of the plotting paper and YO inches above the bottom edge of the Plotting paper. SC is a scale factor, which controls the height of a hill and depth of a valley in the figure. If SC= 0.0, the subroutine will use an appropriate scale. RATIO is the ration of y-direction scale over x-direction scale.

3. Other options.
Include COMMON/OTHERS/LHIDE, LBOX, LINE, BA, RF
Where

LHIDE =0; No Lines are removed

=± 1; All hidden surface lines are removed

=±2; Hidden surface lines and hidden box lines are removed

C576-417-370

THREED

Page 2 of 3

When LHIDE is negative, visible lines of the underside of the surface are also plotted.

LBOX =0; The box and side bars are not plotted

=1; The box is plotted

=2; The box and sidebars are plotted

LINE =1; Only lines parallel to the x-axis are plotted

=2; “ “y- “

=0; Lines in both directions are plotted.

BA = Level of the base of the box in the same unit as F

RF = Level of the roof of “ “

STORAGE: THREEED calls subroutine STEREO, PLAT, INSPECT and SYSPLT

THREED = 1218	STEREO= 13882
PLAT= 578	INSECT= 788

STATUS This subroutine is on SYS2.FORTLIB (the 370 FORTRAN Library).

NOTE This subroutine was originally written for the CDC computer and the CDC version was Contributed by a user.

DD CARD One of the following DD card should be included

Narrow	{//SYSPLTDN	DD	SYSOUT=N
Paper	{//GO.SYSPLTD	DD	SYSOUT=N
Wide	{//SYSPLTDW	DD	SYSOUT=W
Paper	{//GO.SYSPLTDW	DD	SYSOUT=W

APPENDIX C

OBSERVABILITY FROM JALAMA BEACH

The distance to Jalama Beach from the boathouse is about 37,000 feet. Using the diagram below we reasoned as follows:

$$\tan \theta/2 = x/y$$

$$Y \tan \theta/2 = x$$

$$2x = 2y \tan \theta/2$$

for very small θ , $(\theta/2)$ radians

$$= \tan \theta/2$$

Thus

$$2x = 2y (\theta/2) \text{ Rad}$$

$$2x = y \theta \text{ Rad}$$

Maximum visual acuity is 1/60 degree (2.91×10^{-4} rad), therefore the

Smallest detectable size at 37,000 ft is given by

$$2x = 37,000 \text{ ft} \times 2.91 \times 10^{-4} \text{ rad}$$

$$2x = 10.7 \text{ ft (F)}.$$

This under best possible conditions, the minimum detectable size would be about 11 feet. The cut is expected to be in the neighborhood of 200 ft at the top of the bluff, so it was considered detectable.

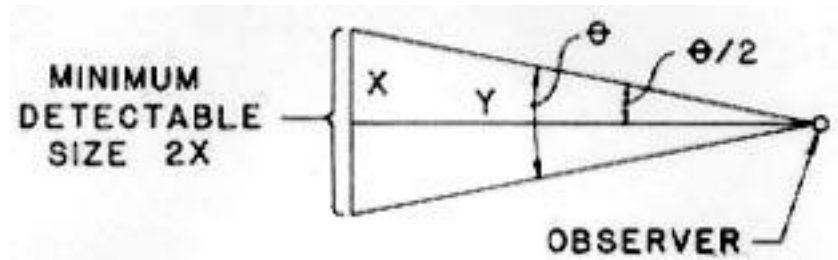
The possibility that the curvature of the earth would hide the cut was considered (refraction by the atmosphere has the opposite effect)

$$H = 0.021 M^2 \text{ (ft)}$$

Where H = Height lost (combined effect of curvature and refraction)

$$H = 0.021 (1369) = 29 \text{ ft (F)}$$

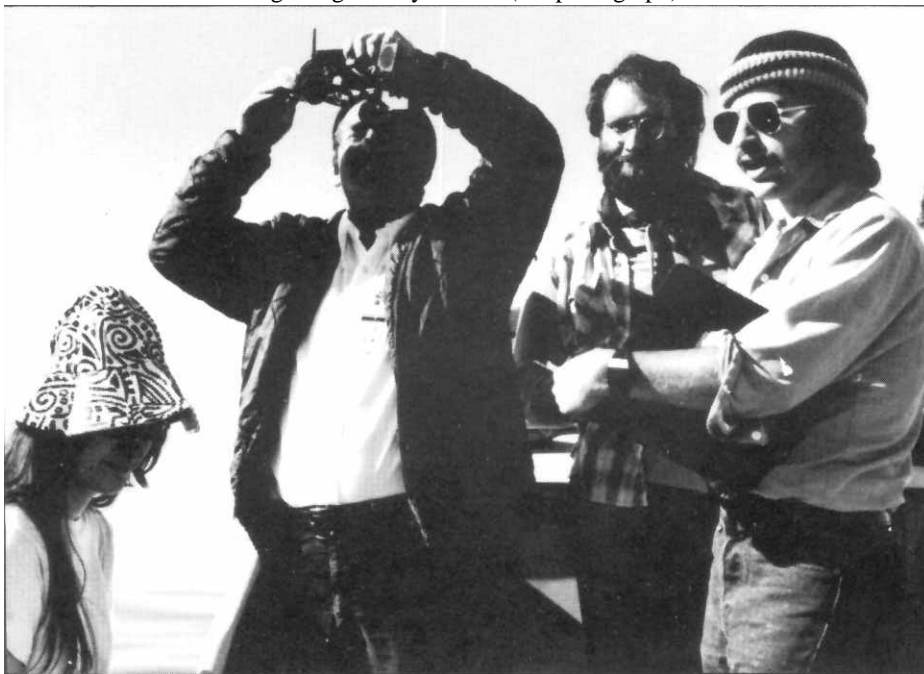
The bluff is at an elevation of about 50 ft, so the curvature of the earth would reduce, but not eliminate, a view of the proposed cut.



APPENDIX D
PHOTOGRAPH INFORMATION

- Figure 1 Official USAF photographs (VAFB).
- Figure 24 Mr. Lee Freeman, Plympus 35mm with 55mm lens.
Kodacolor II film, ASA 100 (H).
- Figure 27 Mr. Steve Tom, Linhoff Technika, 4x5 in. with 135 mm
Kodak wide field Ektar lens. Verecolor II type S film,
ASA 100 (H).
- Figure 28 Same as figure 27 with touch-up by Mr. Gerald Cook (I).
- Figure 29,
31, 33 Mr. Steve Tom, Linhoff Technika, 4x5 in. with 162 mm
Graflex Optar Lens. Verecolorr II types S Film, ASA 100 (H).
- Figure 30,
32, 34 Same as figure 29 with touch up by Mr. Gerald Cook (I).

Photographs for figures 29 through 34 were taken from the stern of a Radon boat. Positions along the view rays and distance from the shore were obtaining using a Navy sextant (see photograph).



Obtaining Illustration positions. Left to right: Ms. Lynne Reardon, Messrs. Lee Freeman, John Edwards, and Marty Fabrick.

APPENDIX E

ACRONYMS

DOD	=Department of Defense
EIS	=Environmental Impact Statement
ET	=External Tank
ISO	=Perspective parameter in 3-D computer program
RATIO	=Ratio of the x scale to the y scale in the computer program
SC	=Scaling factor in 3-D computer program
SDB	=Shallow Draft Barge
STS	=Space Transportation System
USAF	=United States Air Force